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OIL AND GAS JOURNAL

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CLEANOUT

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WITH THIS FRANKS UNIT

to 10,000 Feet and Below

PLUS

100% PORTABILITY

STAR FEATURES

- ★ Franksair Finger-Tip Full Air Controls.
- ★ Famous Power Screw Raised Derrick.
- ★ Final Friction Drive Air Actuated Clutches.
- ★ Hydromatic Brake Optional.
- ★ Most Economical Unit on the Market.
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The first 102 foot telescoping derrick rotary drilling unit.
Completely self-contained and self-propelled for 12,000 ft. workover with 2⅞" drill pipe and 6,000 ft. drilling with 3½" drill pipe.
Operation at ground, 5 ft. or 10 ft. substructure heights.
Available in 3 models, single or double drum, truck or trailer mounted.

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FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

Franks Model 137-DTD on location in Texas

PRICE 50 CENTS

TABLE OF CONTENTS PAGE 161

MAY 19, 1949

ROCKWELL-EMCO
ORIFICE METER GAUGES

WITH MACNICK CHART CLOCKS

SERVICE-EASE
ACCESSIBILITY
FLEXIBILITY
Save you money

The entire meter can be dismantled or built up using common, everyday tools.

You get more than just a precision measuring instrument when you buy Rockwell-Emco orifice meter gauges. You get a strongly built, soundly engineered mechanical construction. You get the service ease of a fully accessible arrangement of working parts. And you gain the added advantage of flexibility—for this meter alone quickly converts to any one of four standard differential ranges by simply interchanging high pressure chambers. Want more facts about the service economies of Rockwell-Emco orifice meter gauges? Then write for bulletin 1050.

MACNICK CHART CLOCKS

Standard on Rockwell-Emco orifice meter gauges unless otherwise specified. Strongly made, hermetically sealed. Converter gears permit chart rotation speed (such as 7 day, 48 hour and others). To be changed without removing clock from gauge case.

THE ROCKWELL-EMCO INTEGRATOR

Mechanically calculates orifice meter charts of various makes with machine precision. Extension appears as a total on a straight reading register. Operator traces colored lines over static and differential records to verify results. The machine will handle upwards to 300 average charts a day. Write for bulletin 1016.

PITTSBURGH EQUITABLE METER DIVISION

Rockwell Manufacturing Co. · Pittsburgh 8, Pa.

Atlanta Boston Chicago Houston Kansas City Los Angeles
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WALWORTH LUBRICATED PLUG VALVES

offer these advantages

- . . . Direct port opening
- . . Quarter turn opens or closes valve
- . . . Dead tight shut-off
- . . . Freedom from attack by fluids being handled
- . . . Pressure sealed
- . . Made in a complete line. Sizes from ½" to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many *difficult* services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steel-iron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH

valves and fittings

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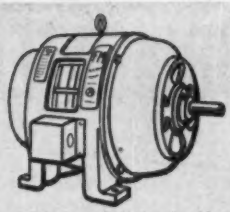
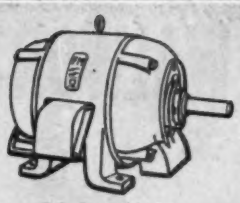
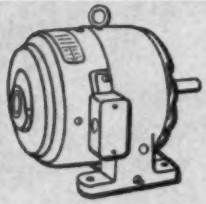
Vertical Motors



General-Purpose Ball-Bearing Motors

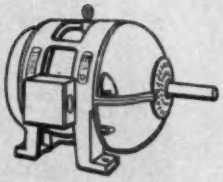


Splashproof Motors



Motorgears

Multi-Speed Squirrel-Cage Motors



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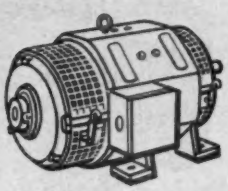
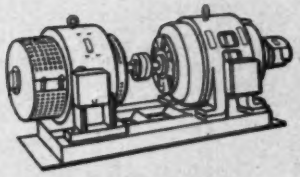


D.C. Motors

You stand to gain much in dealing with your Fairbanks-Morse Branch or Dealer as the single source for *all* your electric motor requirements. Not the least are the benefits of undivided responsibility, unprejudiced advice and application assistance. For your copy of the handy "Pocket Panorama" which illustrates the complete line . . . write Fairbanks, Morse & Co., Chicago 5, Illinois.



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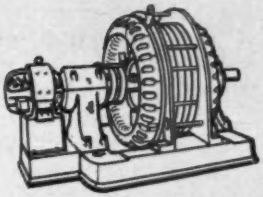
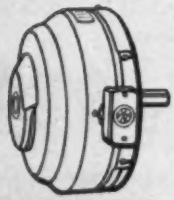
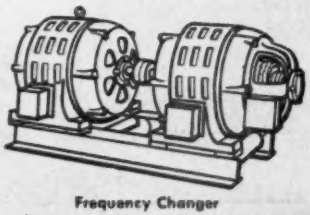


High-Speed A.C. Generators



Axial Air Gap Motors

Low-Speed A.C. Generators



Frequency Changer

MODERN PIPE LINES

Begin in the Air!

Edgar Tobin Aerial Surveys pipe line mapping service is the modern method of saving time and cutting costs.

Tobin maps — valued in excess of $7,000,000.00 — cover more than 500,000 square miles of territory, stretching from New Mexico to Florida. This vast aerial map library — backed up by more than 300 Tobin specialists in map making — is immediately available for pipe line location.

The use of Tobin maps in routing pipe lines saves both time and money. In most cases the territory has already been mapped, and you pay *only* for the strip map that is needed. These strips provide an accurate picture of the land, in scale, along the entire length of the contemplated route. In addition to Photographic Maps, Tobin Service includes Contact Prints and Ownership Maps.

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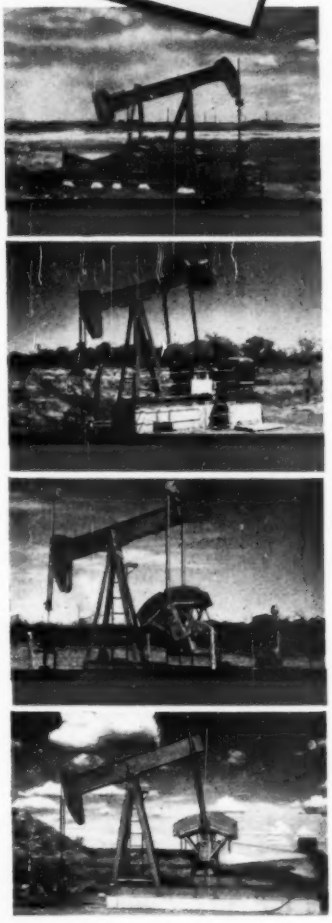

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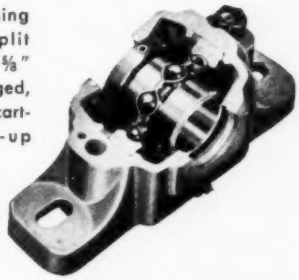
Solid or split housing pillow blocks (solid shown) for shafts 5/8" to 3 15/16"—also flanged, take-up, and hanger blocks.

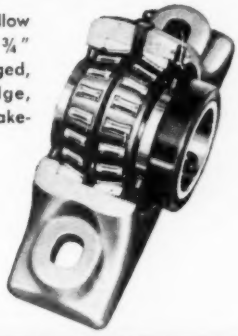
Series 300 ball bearings

Solid or split housing pillow blocks (split shown) for shafts 5/8" to 3 15/16". Also flanged, flanged cartridge, cartridge and take-up blocks.



Series 400 roller bearings

Solid housing pillow blocks for shafts 3/4" to 4"—also flanged, flanged cartridge, cartridge and take-up blocks.

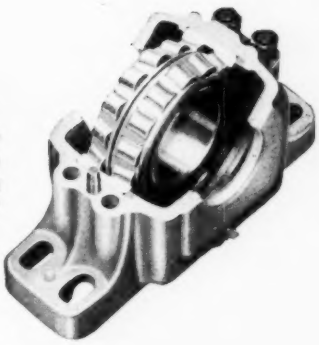


Series 6800-6900 roller bearings

Split housing pillow blocks with adapter sleeves for mounting on commercial shafting of 1 7/16" to 6 15/16" diameter.

Split housing pillow blocks for press-fit on precision-turned shafting of 1.7700" to 7.4800" diameter.

Series 7800-7900 roller bearings



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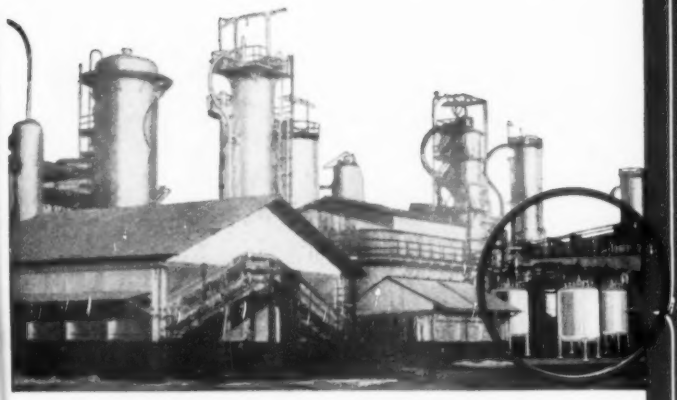

Flawless construction that insures flawless performance through "Plus Factors"

Middle gauge or heavy plate welded construction — carbon, alloy or clad steels — Fractionating towers and pressure vessels — Stress relieving and hydrostatic testing. Nooter welding techniques embody every phase of API-ASME code procedures.

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Send for Nooter Catalog with Corrosion Data Tables.

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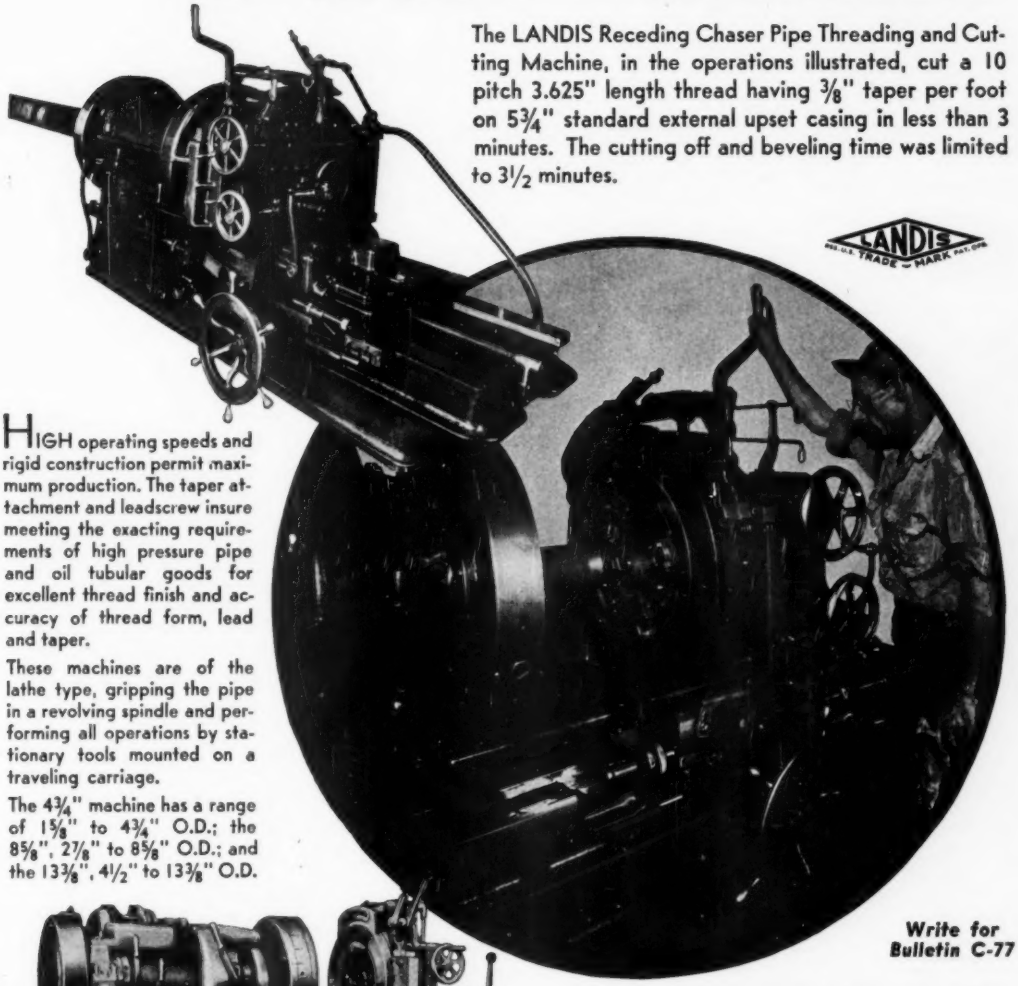
ACCURATE TUBULAR GOODS
at HIGH PRODUCTION

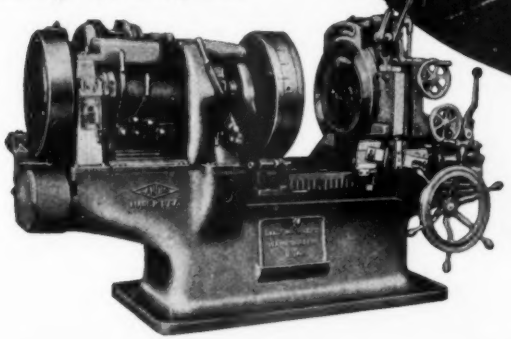
The LANDIS Receding Chaser Pipe Threading and Cutting Machine, in the operations illustrated, cut a 10 pitch 3.625" length thread having 3/8" taper per foot on 5 3/4" standard external upset casing in less than 3 minutes. The cutting off and beveling time was limited to 3 1/2 minutes.



HIGH operating speeds and rigid construction permit maximum production. The taper attachment and leadscrew insure meeting the exacting requirements of high pressure pipe and oil tubular goods for excellent thread finish and accuracy of thread form, lead and taper.

These machines are of the lathe type, gripping the pipe in a revolving spindle and performing all operations by stationary tools mounted on a traveling carriage.

The 4 3/4" machine has a range of 1 5/8" to 4 3/4" O.D.; the 8 5/8", 2 7/8" to 8 5/8" O.D.; and the 13 3/8", 4 1/2" to 13 3/8" O.D.



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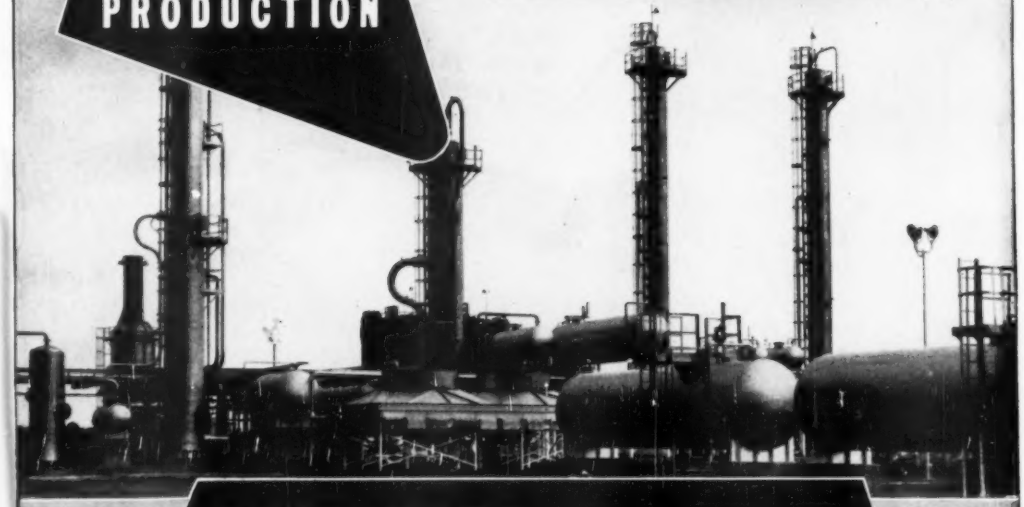
FROM PLANNING TO PRODUCTION



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*You are invited to consult Pritchard on both phases of your next petroleum engineering project.

1. **OIL FIELD PROCESSES**—Cycling, Pressure Recovery Systems, Crude Stabilization, etc.
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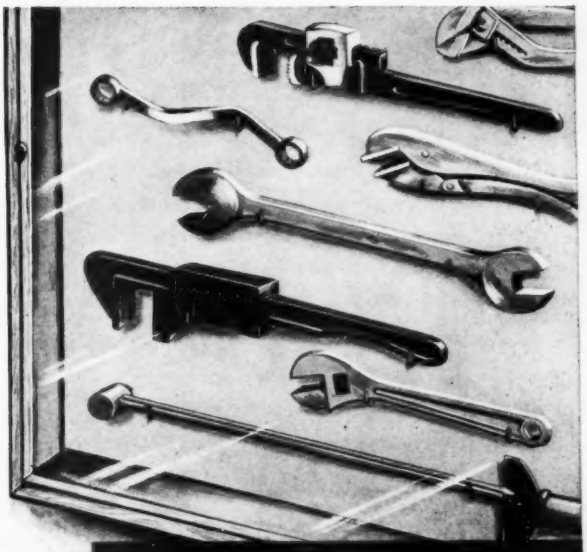
You pick the Wrench that's right-

buy your V-belts the same way



FOR any job you do, there's just one wrench that's *right*. And for V-drives, there's only one right type of V-belt. That's why Goodyear offers the most complete line of V-belts — *featuring a construction to meet every drive requirement.*

For drives where belt stretch and maintenance are problems, there's the exclusive Goodyear development — COMPASS-V-Steel belts with wiry, steel-cable load carriers. If the drive runs at high speed, over small pulleys on short centers, choose a Goodyear belt bodied with single-plane endless cords for high flex-life. If you're having trouble with high overloads and shock stresses, pick a Goodyear belt built around multiple, high-tensile resilient cords. For drives where belts are hard to apply — or for quick emergency replacements — use Goodyear's open-end belting with a special fabric body of high fastener-holding strength.

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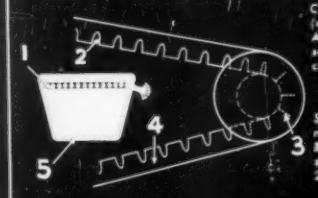
When desired, these time-proved constructions can be supplied—built with oil-resistant, heat-resistant or non-static rubber. The G.T.M. — Goodyear Technical Man — will gladly recommend the proper Goodyear V-belt to give you long, trouble-free service at the lowest ultimate cost. Write: Goodyear, Akron 16, Ohio.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING *made to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.*

GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GTM-Specified COMPASS-V-STEEL BELT



Compass-V-Steel belts (notched) available in A, B and C cross-sections up to and including 112".

Steel Cable belts (unnotched) available in B, C and D cross-sections from 120" to 240" inclusive.

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2—Vents open between pulleys, dissipating heat

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4—Highest quality rubber underbody

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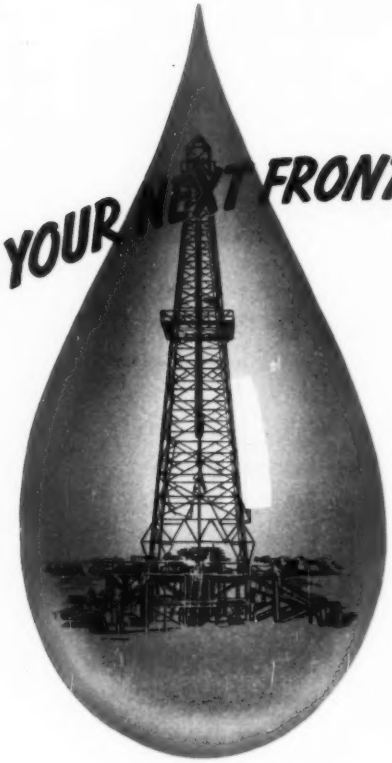
V-BELTS

TAKE A LOOK NOW AT YOUR NEXT FRONTIER



Deeper exploration—like deeper drilling—requires more than average care and skill.

For many operators who are looking forward to deeper drilling as their next frontier, General's experienced crews are now compiling accurate data on prospective producing formations as deep as there are reflecting horizons—to the deepest sedimentary beds.

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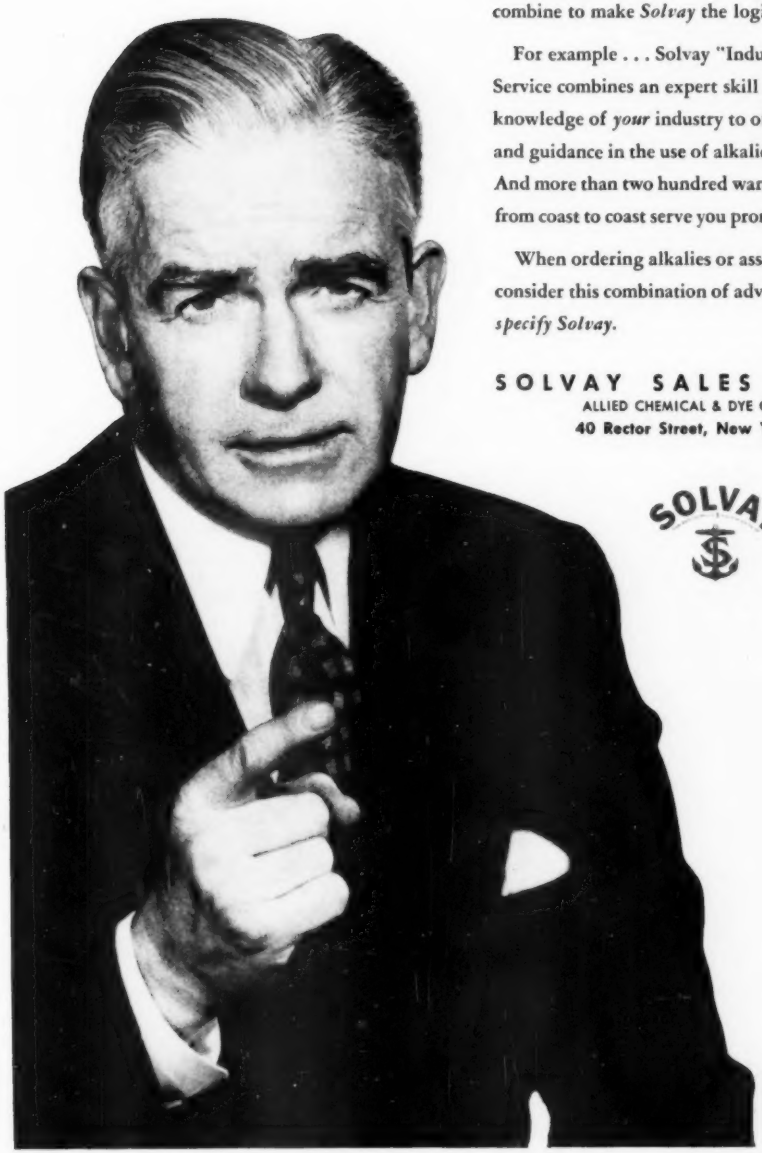
When ordering alkalies or associated chemicals, consider this combination of advantages and you, too, will *specify Solvay.*



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DOES SO MUCH . . . COSTS SO LITTLE

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HOUSTON LIGHTING & POWER COMPANY

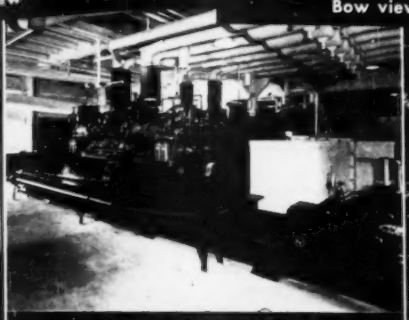
CONVERTED FROM NAVY SEAGOING BARGE TO MAGNOLIA DRILLING BARGE, BY

Levingston

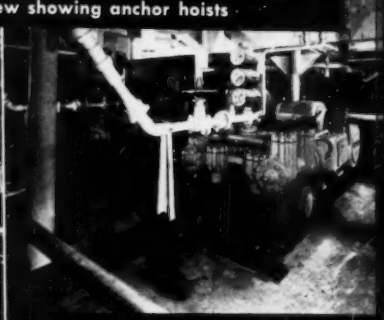
Aft starboard view

Bow view showing anchor hoists

Main dining room



Power units for drilling



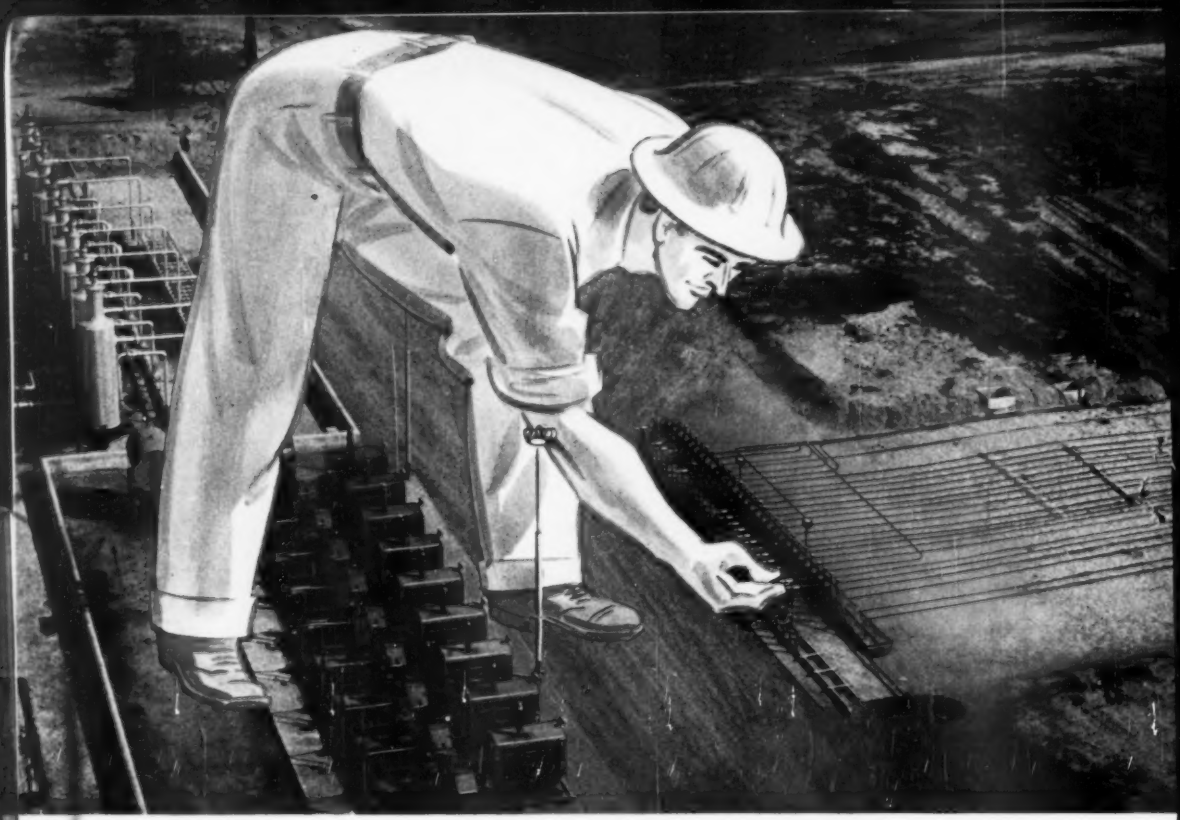
Slush pumps

Presented above are views of the Magnolia Drilling Barge No. 3 which was placed in service recently on an off-shore location in the Gulf of Mexico.

Levingston

SHIPBUILDING COMPANY

ORANGE, TEXAS



YOUR PUMPER IS A *Bigger* MAN NOW!

Free Pumping has increased the stature of your pumper and his importance to your organization. He has been made independent of outside help. He doesn't have to call in a pulling crew or service unit when he wants to surface the bottom hole pump. He just turns a valve.

The compact central plant, from which he regulates the pumping rate of each well and where he gathers all essential bottom hole information, further adds to his capacity for doing a better job. This centralized control reduces well spacing to 18 inches, which is equivalent to equipping your pumper with "seven league" boots. He can visit every well and not leave the header manifold. That gives him an opportunity for necessary maintenance work.

Yes, your pumper is a much bigger man today, if you are giving him Free Pumping equipment to work with.

Why not enjoy the operating economies and saving on equipment made possible by Free Pumping? Your local Kobe representative has some interesting facts to show you.

Free Pump

KOBE

ONE OF THE DRESSER INDUSTRIES

KOBE, INC. *General Offices:* Huntington Park, Calif. *Division and District Offices:* Avenal, Bakersfield and Ventura, Calif.; Rangely, Colo.; Ardmore, Oklahoma City and Tulsa, Okla.; Brownfield, Corpus Christi, Fort Worth, Houston, Longview, Odessa, and Witchita Falls, Texas; Brookhaven, Miss.; Hobbs, N. M.; Great Bend, Kansas, New York City.

THESE ARE THE DAYS OF FREE PUMPING

BEND IT

COIL IT

HANDLE IT ROUGH

GOODALL

FLEXO

LONG LIFE Rotary Hose

is built

to take it

Your rewards for specifying Goodall Flexo Rotary Hose are longer hose life, greater ease of handling and lower hose costs.

That is because Goodall Long Life Flexo Rotary Hose is made on a completely different construction principle that does not depend on tightly wrapped wires for strength.

That construction principle puts Goodall in a class by itself.

It is the only hose that is strong enough to withstand normal whipping from mud pump surge, and at the same time is flexible enough to be shipped in 63″ crates.

Ease of handling is another "plus" benefit of Goodall Flexo hose. It is so flexible and light in weight that all you have to do is loop it into a manageable sized coil and transport it . . . the only precaution necessary is to protect from being crushed or cut by heavy equipment.

You save money too because Goodall Flexo Hose, with Barney Coupling, greatly outlasts ordinary rotary hose.

Unique also, is the complete repair department maintained by the Goodall Rubber Company, for the convenience of Goodall Rotary Hose customers. This service, plus the many advantages of Goodall Flexo Rotary Hose, makes Goodall the favorite of drillers all over the world.

Because of these outstanding features, Goodall Flexo Rotary Hose has long been the favorite of drilling contractors and leading oil companies all over the world.

To get even longer service from your Goodall Rotary Hose, use a swing joint between the standpipe and hose. The extra long service you get from the swing joint installation will reduce hose costs almost to the vanishing point.

GOODALL RUBBER COMPANY — TRENTON, N. J.

GOODALL RUBBER COMPANY OF TEXAS: Houston, Texas

GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City

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Ethyl-developed research methods useful to refiners

Here are some of the specially designed research tools used by the Ethyl Laboratories to study fuels, engines, lubricants and antiknock compounds that you might find helpful in your own research efforts.

THE DEVELOPMENT of experimental equipment and procedures that will produce reliable data is essential to progress in fuels and engines. During the past 26 years an important activity of the Ethyl Laboratories has been the development of procedures for research on problems relating to engines, fuels, antiknock compounds, and lubricating oils.

One of the earliest contributions made by Ethyl was the octane number scale, and this was followed by the development of the first generally distributed knock testing engine. Many other procedures developed by Ethyl can prove equally useful to the refiner who is desirous to obtain:

- **a.** More effective application of his products to the range of conditions encountered in service.
- **b.** A better understanding of the relationships between petroleum products and engines.

Examples of procedures developed at Ethyl Laboratories:

1. Duplicating "road" operation in the laboratory. The duplication in the laboratory of the road performance of engines, requires a schedule of operation simulating the variations in engine speed and load which are characteristic of road operation. Different types of mechanisms—employing pneumatic, electrical and electronic principles—have been devised for reproducing these variations. Fig. 1 shows one type of automatic mechanism which employs a perforated "piano" roll to operate both dynamometer and engine controls to simulate any desired pattern of road operation. For example, Fig. 2 shows how closely the effect of lubricating-oil type on valve life as determined on the road may be duplicated in the laboratory.

2. Multicylinder engine "knocking" research in single-cylinder engines. Some years ago Ethyl engineers measured the variations in the distribution of fuel to the cylinders of engines. It was shown that an irregular pattern of fuel distribution prevailed and that this had a pronounced effect on the knocking tendency of engines and on the relative performance of fuels of different composition. Ethyl engineers developed a bled manifold (Fig. 3) for use with single-cylinder knock testing engines. This manifold permits, under steady operation, the simulation of transient conditions in respect to fuel distribution existing in multi-cylinder engines.

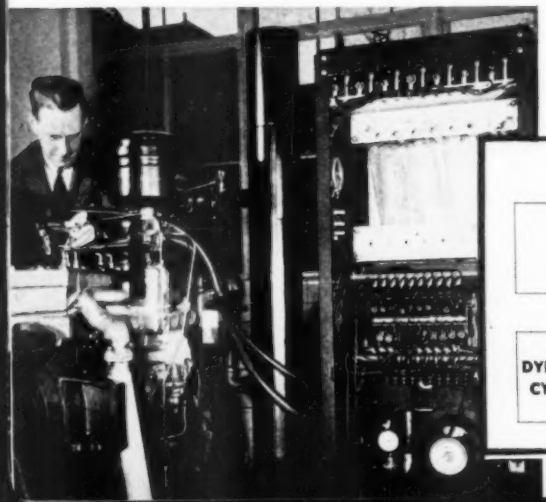
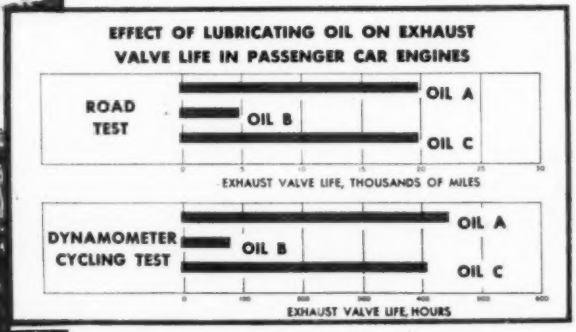


Fig. 1. "Plastic Highway." This special equipment employs a perforated plastic tape for the control of engine speed and torque simulating indoors the variations found in actual road service.

Fig. 2. Chart below shows that when engines on dynamometers are subjected to the same program of variations in speed and load as encountered in road service, comparable performance is obtained.



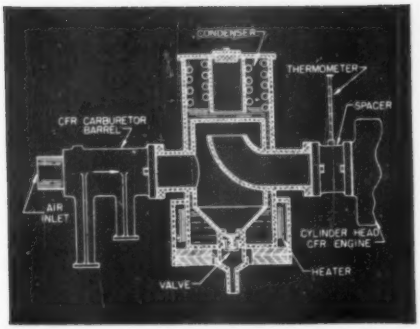


Fig. 3. Cross-section of bled manifold for "knocking" research on single-cylinder engines under conditions simulating unequal fuel distribution encountered in multi-cylinder engines.

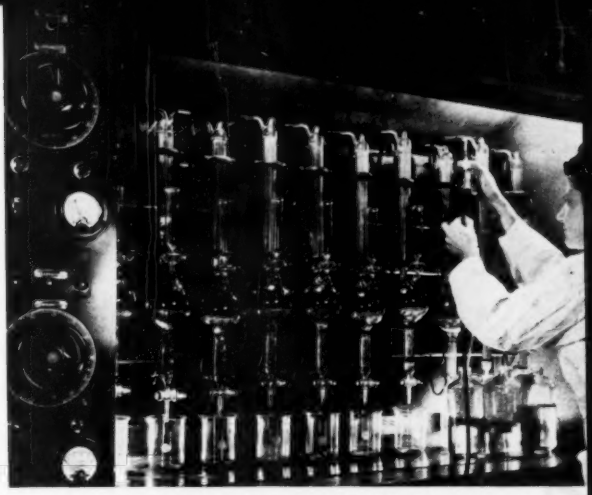


Fig. 4. Apparatus used to determine the tetraethyllead content of gasoline . . . an Ethyl development now widely used.

3. Procedures in analytical chemistry. Control of antiknock quality requires accurate analytical procedures. An example of progress in this field is the development of an accurate and rapid method, now widely used, for the determination of the tetraethyllead content of gasoline (Fig. 4).

4. Testing engine metals under simulated operating conditions. The Ethyl Laboratories designed and built for the U. S. Army Air Forces a special furnace (Fig. 5), which subjects samples of metals used for engine construction to controlled tensile stress under alternate heating and cooling in an atmosphere of combustion products similar to that in engines. This equipment is used by Ethyl and other laboratories for the testing of steels for valves and other engine parts.

Since 1923 it has been Ethyl's objective to render a complete antiknock service. The development of research equipment and procedures is just one part of the over-all Ethyl research effort designed to improve "Ethyl" antiknock compound and to aid refiners in the economical production of satisfactory gasoline.

This message is the fourteenth in a series dealing with problems encountered by refiners in producing gasoline for today's and tomorrow's engines, and the contribution of the Ethyl Corporation to their solution. Future messages will discuss other phases of these problems.

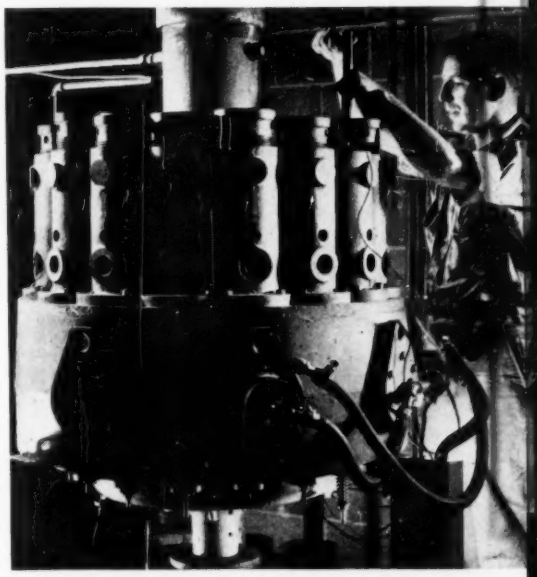


Fig. 5. Furnace developed by Ethyl for the testing of metals employed in engine construction under conditions comparable to those found in actual engine service.

SINCE 1923—*Continuous Research to Provide Better Antiknock Service*

ETHYL CORPORATION

RESEARCH LABORATORIES

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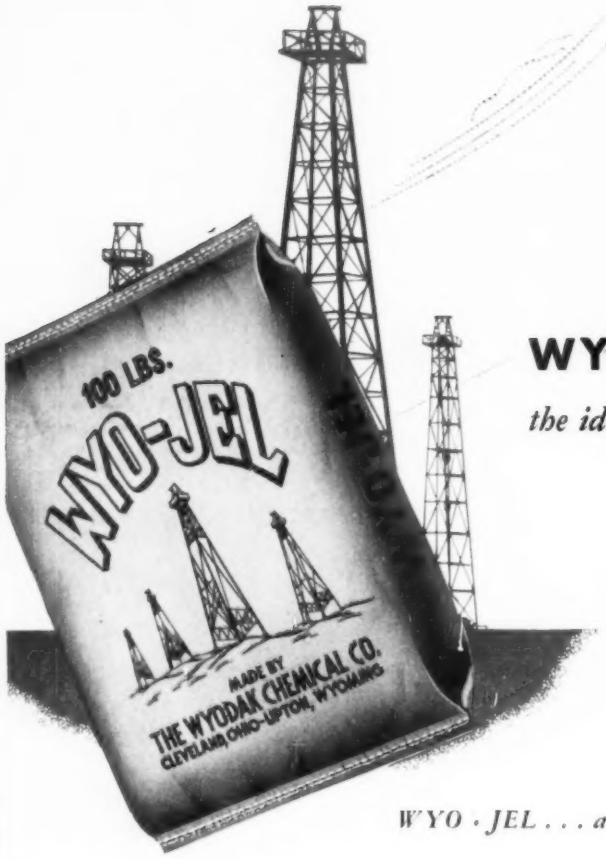

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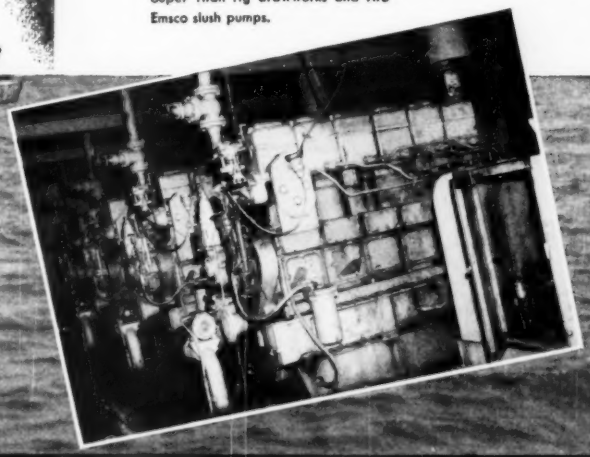
Loffland Brothers Drilling Company meets a wide range in horsepower requirements on this barge by using five models of Cummins Diesels to power the rotary table drawworks, slush pumps, a mud mixing pump, coring unit, three centrifugal pumps, generators and compressors.

And here's proof that Cummins teamwork pays off: in completing its fourth well, the *Matagorda* rig went to 6,940 feet in 18 days.

For complete information, write for Bulletin 5263 today.

(*Left*) The *Matagorda.*

(*Below*) Four Model U-600 Cummins Diesels power the Wilson Super Titan rig drawworks and two Emsco slush pumps.



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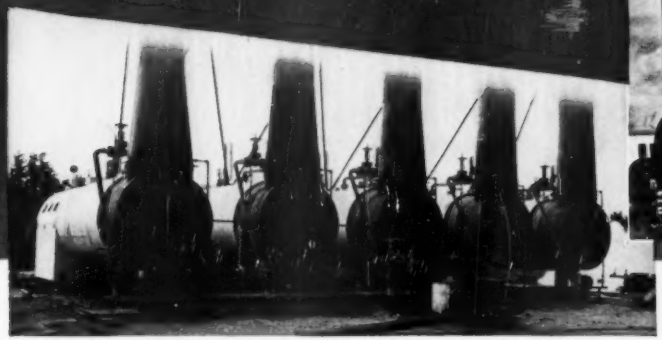

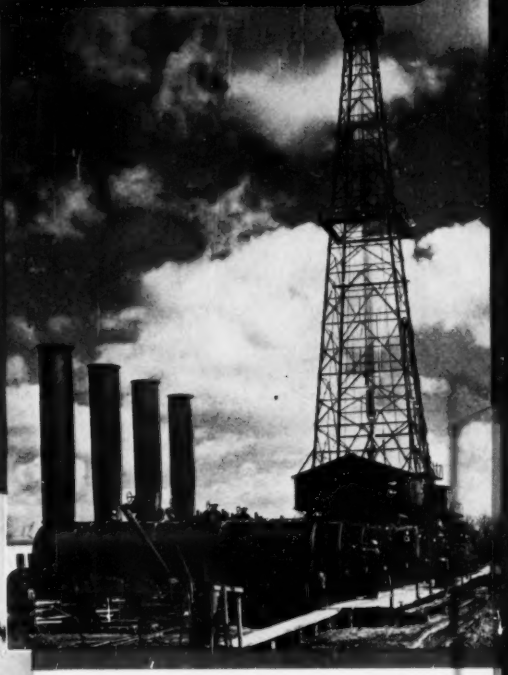

Left: Battery of five 150 H.P., 500 Lbs. working pressure boilers used on Superior Oil Company's record well in California.

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150 HORSEPOWER

Actual HP output is far in excess of this minimum rating

350—500 LBS. WORKING PRESSURE

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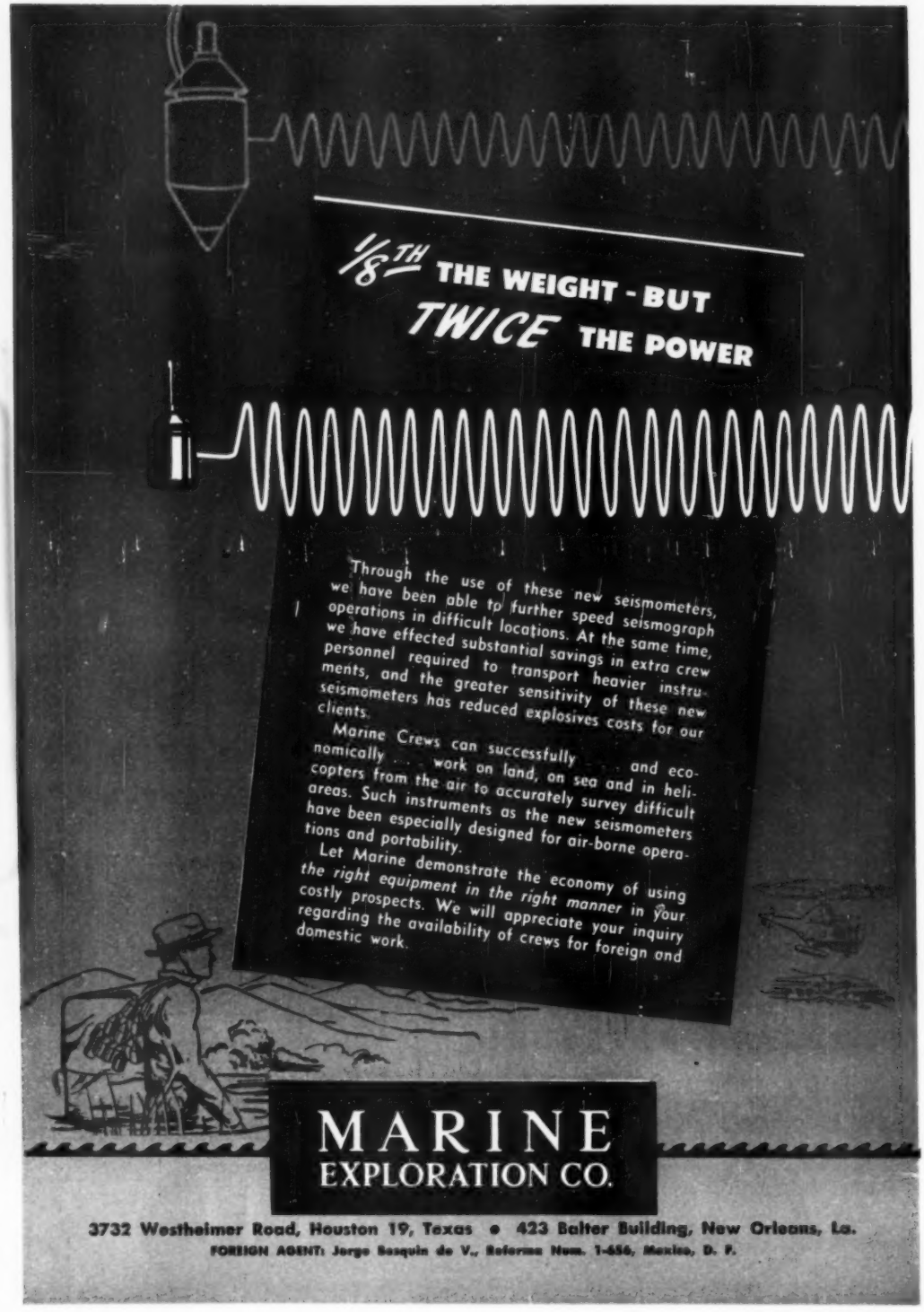
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Through the use of these new seismometers, we have been able to further speed seismograph operations in difficult locations. At the same time, we have effected substantial savings in extra crew personnel required to transport heavier instruments, and the greater sensitivity of these new seismometers has reduced explosives costs for our clients.
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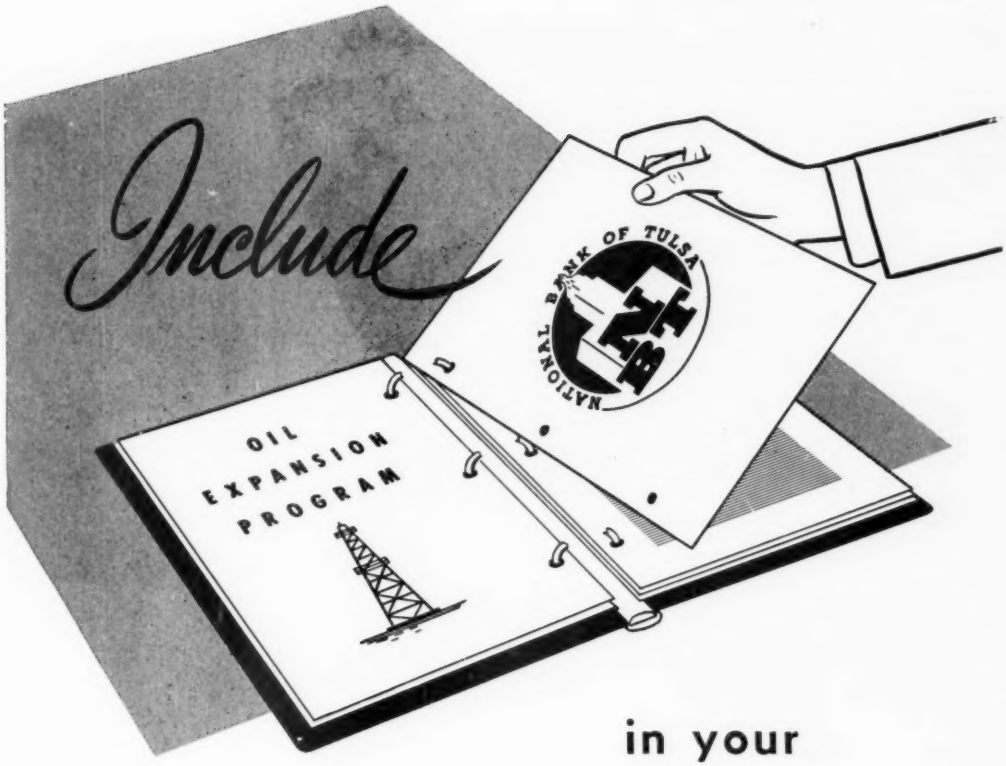

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DEVELOPMENT PLANS

If you are planning to expand your oil operations — such as purchasing new equipment, drilling new wells or buying out associates — your first consideration naturally concerns the financial requirements of such a move.

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The Oil Bank of America

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Uses steam or compressed air for atomization. Thoroughly atomizes and completely burns the lowest and cheapest grades of fuel oil and tars. Requires only low oil pressure and temperature.

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Large capacity burner of steam atomizing type. Adaptable to large boilers or dual fuel systems. Is frequently used for firing boilers above existing coal grates.

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(Where steam, or gas is available for atomizing) safely and efficiently burns residuums obtained from process.

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An "Airocool" Gas Burner in combination with a Type "SAR" Steam Atomizing Oil Burner. Type "SAR" safely and efficiently burns residuums obtained from process.

"AIROCOOL" GAS BURNER
Venturi type. Patented, long-life "Airocool" Nozzle assures trouble-free operation and provides low turn-down without burn-back.

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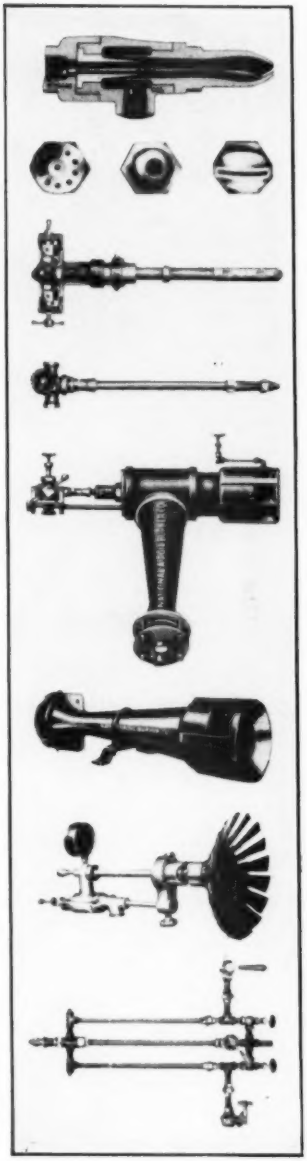
(Refuse Oil Burner) burns acids or caustic oils, sludges, asphalts, tank bottoms, polymer oils, heavy petrolatum organic oil residuums, waste cutting oils, sulphite pulp liquors in combination with fuel oil.



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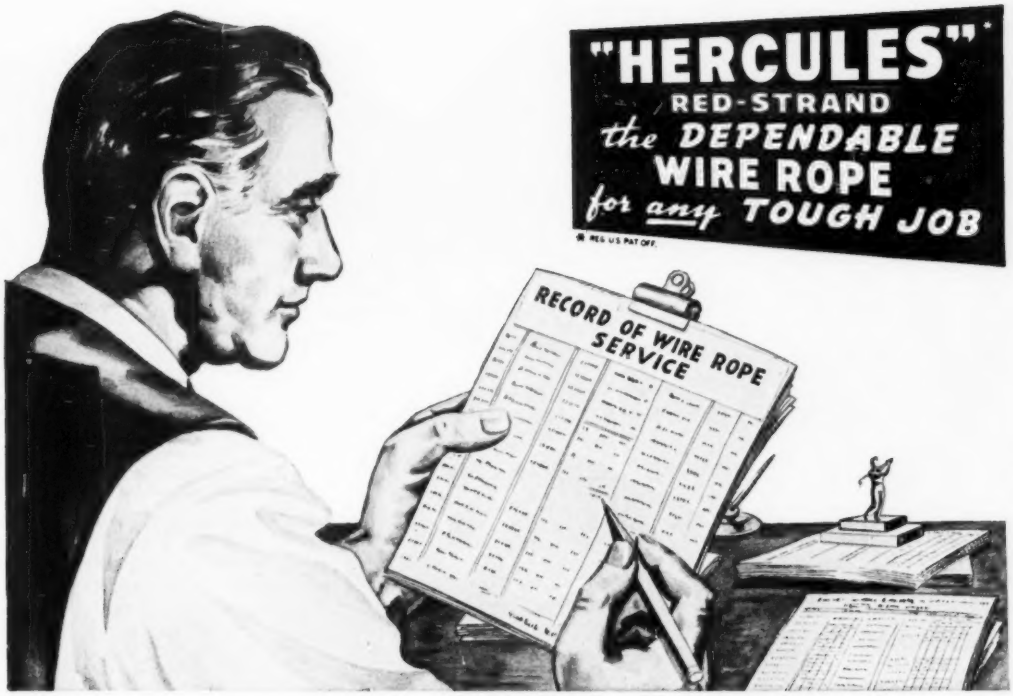

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With wire rope, as with various other equipment, many claims can be presented . . . but in the final analysis, it is the record of PERFORMANCE that determines the ultimate cost.

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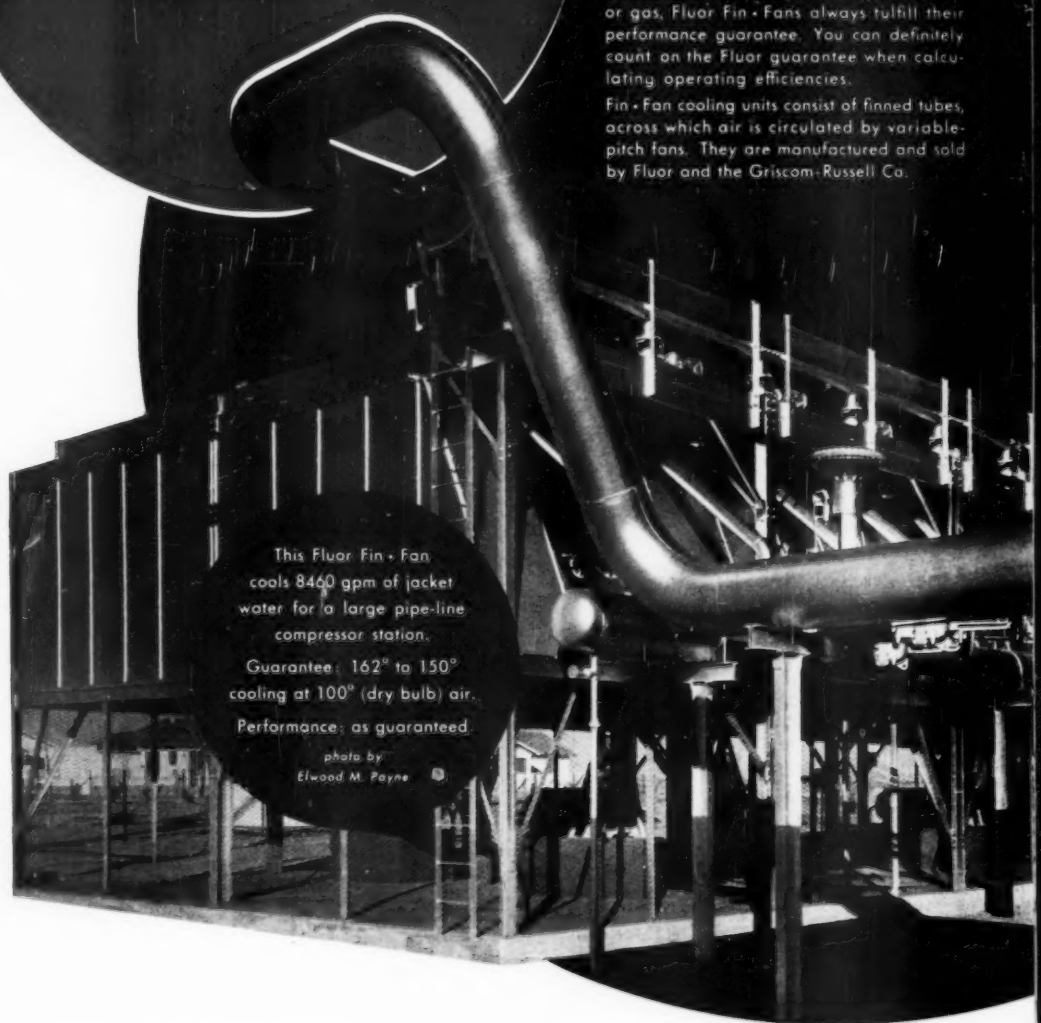
HEAT EXCHANGERS
COOL AT LOWEST COST

Hot! Bad! Expensive! When the temperature of the fluid to be cooled is much higher than ambient air temperature, when available water has bad scaling characteristics, or when make-up water is scarce and expensive, then you should definitely investigate the use of a Fluor Fin • Fan heat exchanger.

Guaranteed Performance

Whether used to cool process liquids, water, or gas, Fluor Fin • Fans always fulfill their performance guarantee. You can definitely count on the Fluor guarantee when calculating operating efficiencies.

Fin • Fan cooling units consist of finned tubes, across which air is circulated by variable-pitch fans. They are manufactured and sold by Fluor and the Griscom-Russell Co.



This Fluor Fin • Fan cools 8460 gpm of jacket water for a large pipe-line compressor station.

Guarantee: 162° to 150° cooling at 100° (dry bulb) air.

Performance: as guaranteed.

photo by Elwood M. Payne

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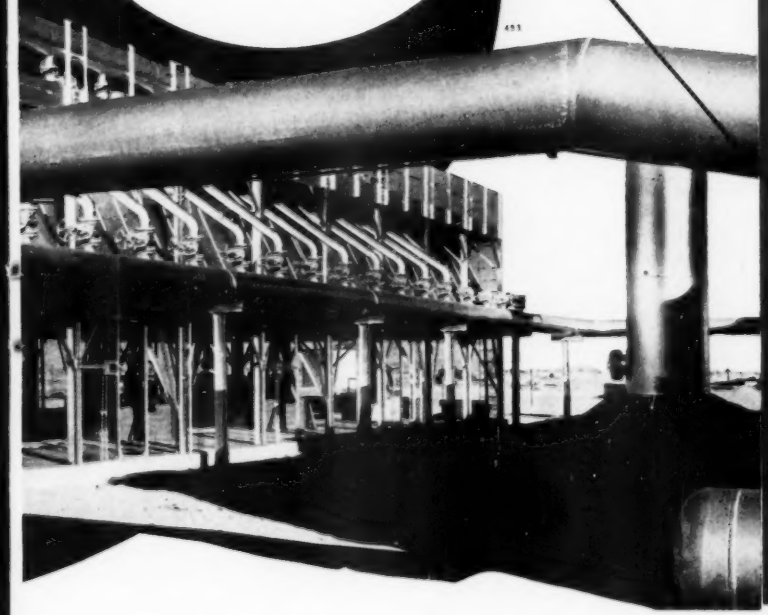


Aerator Towers

Counterflo Towers

Pulsation Dampeners

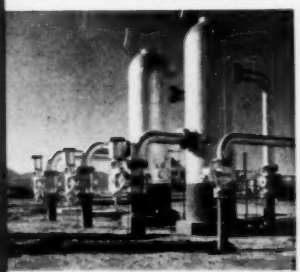
Gas Cleaners

Mufflers

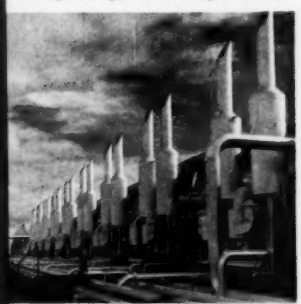
Fluor Aerator cooling towers have distinctive economy features and are most practical in certain cooling applications.

Fluor Counterflo induced-draft cooling towers are a standard of industry for most water-cooling applications. They deliver "colder water cheaper."

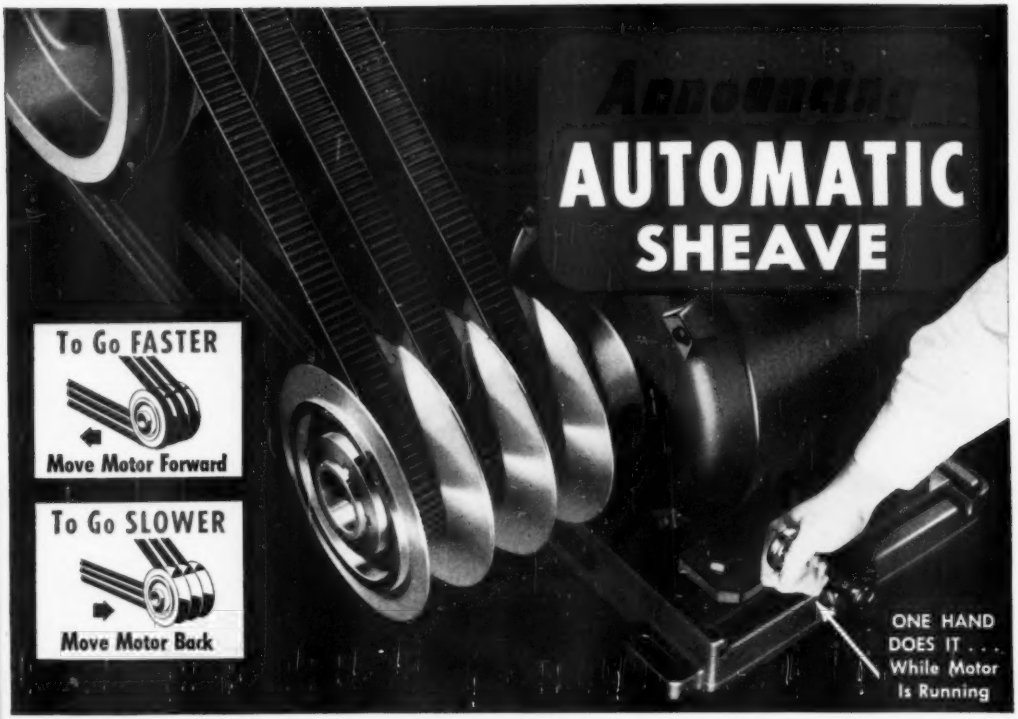
Fluor pulsation dampeners remove destructive vibrations and instrument irregularities caused by pulsative gas flow.



The Fluor gas cleaner, already well-known for efficient cleaning, has been redesigned to give still better performance.



Fluor mufflers, redesigned to incorporate pulsation-dampener principles, reduce exhaust-line noises to less than the mechanical noises of the compressor room.



Varies Speed *WITHOUT STOPPING*

Another *Texrope* Engineering Triumph!

- Instant speed control at lower cost than ever before
- Covers most speed changing needs from 3 to 20 hp
- Extremely simple — one sheave does all
- Infinitely variable speed — 200% range

SIMPLEST, most economical method of instant speed control ever devised. Simply move motor forward to increase speed and move it back to decrease. The new *Vari-Pitch* Automatic Sheave changes pitch diameter and holds belts at proper tension automatically. All other parts of the drive are standard *Texrope* V-belt drive components.

For details see your A-C Authorized Dealer or Sales Office or write for bulletin 20B7223. *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

A-2709

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

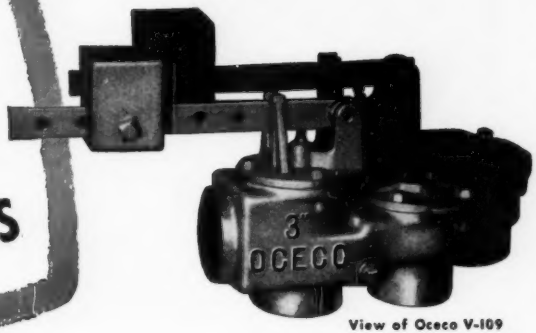
ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

View of Oceco V-103 Vacuum Relief Valve.

View of Oceco V-106 Pressure Relief Valve.

OCECO V-103; V-106 and V-109 VALVES



View of Oceco V-109 Combined Vacuum and Pressure Relief Valve.

provide positive protection against excessive vacuum and pressure

● Oceco V-103, V-106 and V-109 Relief Valves are efficient, highly dependable and moderate in price. They require little or no maintenance, and reflect in every detail the advantage of our long and intimate experience with the needs of practical every day operations.

The V-103 Vacuum Relief Valves and V-106 Pressure Relief Valves are furnished in 3" x 3", 4" x 4", and 6" x 6" sizes, and are designed for temperatures up to 600°F. They can be used singly, or in pairs when it is desired to protect the tank or vessel against the effects of both vacuum and pressure. Standard setting for the V-103 Valves is 4 oz. per sq. inch but settings from 1½ oz. to 1 lb. per sq. inch can be furnished on special order.

The V-106 Pressure Relief Valves are of lever and weight design, and can be furnished with pressure settings from 2 lbs. to 30 lbs. per sq. inch to meet the individual requirement.

The V-106 Valve combines vacuum and pressure relief in a single body, and eliminates the necessity of using two valves when both pressure and vacuum relief is required. Furnished in 3"; 4"; 6" and 8" sizes. Wide range of vacuum and pressure settings.

Complete details including prices, body and trim specifications etc. furnished promptly on request.

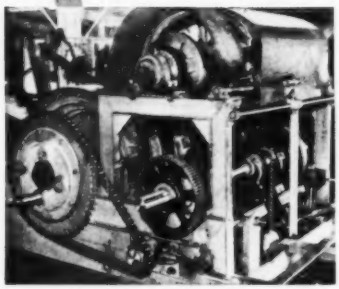
OCECO

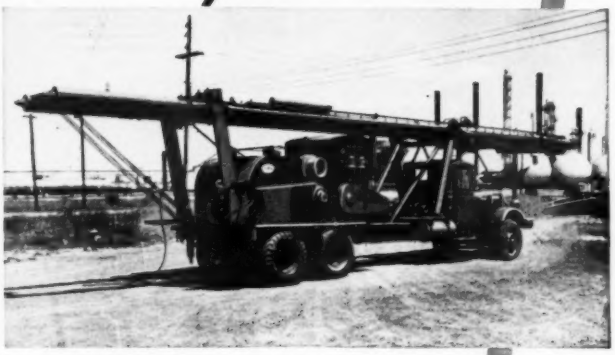
***Division of* THE JOHNSTON & JENNINGS CO.**

CLEVELAND 14, OHIO

NEW YORK • PITTSBURGH • DETROIT • CHICAGO • ST. LOUIS • TULSA • BEAUMONT
MOBILE • CASPER • SAN FRANCISCO • LOS ANGELES • TORONTO AND MONTREAL

MORSE Roller Chain *fits the picture*





Morse Roller Chain—flexible, rugged, economical—meets the exacting demands of the best petroleum equipment manufactured. It is used on this truck-mounted 4000' single drum rotary Wichtex, made by the Wichtex Machinery Company, Wichita Falls, Texas.

ALMOST any petroleum equipment can improve its performance picture by the use of Morse mechanical power transmission products.

Here's just one instance where this is proved. Morse Roller Chain, used by the Wichtex Company in its single and double drum rotary drills, helps to maintain top performance through dependable power transmission.

Petroleum equipment manufacturers choose Morse Roller Chain time and again for their mechanical power drives. They know it will stand up under the gruelling punishment machinery must take in drilling operations. And they know it to be an efficient, flexible drive which gives long, trouble-free service life and low-cost, positive power transmission.

Morse Roller Chain is manufactured in all American Standard pitches and widths. Morse sprockets embody Morse's designing and engineering skill. Mass-production facilities and modern equipment result in accurate quantity production at low cost.

Check on Morse Roller Chain for possible improvement in the mechanical power transmission in your equipment. And remember that replacement chains are immediately available in distributor's stocks near-by. Write for details. Dept. 348, Morse Chain Company, Detroit 8, Michigan.

Morse Morflex Coupling

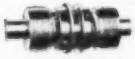
MORSE

MECHANICAL
POWER TRANSMISSION
PRODUCTS

A PRODUCT OF BW BORG-WARNER

Morse Silent Chain Drives

Morse-Rockford Clutches



Morse-Rockford Pullmore Clutches

MORSE CHAIN COMPANY DETROIT 8, MICHIGAN

BRANCH OFFICE AND WAREHOUSE, 1308 LA BRANCH, HOUSTON, TEXAS

Precision is Tradition at

Pittsburgh Steel

Your oil country tubing and casing will tong up tight with a minimum of leakers if it's Pittsburgh Seamless. For the precision threading of quality seamless tubular goods has long been a tradition at Pittsburgh Steel—a tradition backed by exacting control of every other step in the manufacturing process as well. To enjoy the economy of tight, strong joints—specify Pittsburgh Seamless. For complete information write to Dept. OG, Pittsburgh Steel Company, Grant Building, Pittsburgh 30, Pa.

Lewis F. Case—Inspecting precision threads on oil well tubing at Pittsburgh Steel Company.

Pittsburgh Steel Company

Where the country is rough and the hills rugged, and cumbersome heating kettles can't be conveniently used on the line, cold applied NO-OX-ID coatings for underground pipe protection offer the most convenient, positive assurance against corrosion.

NO-OX-ID "GG," a chemically inhibited, pliable coating, can be easily applied cold, by hand. As a protective shield, No. 4 NO-OX-IDized Wrapper, a high tensile strength, laminated, moisture-resistant, reinforced fabric, can be easily handled by a coating crew. This wrapping keeps the NO-OX-ID in intimate contact with the pipe.

A tough, plastic service coat of NO-OX-ID Filler Red "C," brushed on cold by hand, completes a conveniently applied, three-way combination of perfect underground pipe protection for maximum service and minimum equipment where the going gets rough.

NO-OX-IDs are versatile coatings—for hot or cold climates, for hot or cold applications, easy to use under any conditions.

Dearborn Engineers, located conveniently throughout the country, will be glad to discuss these and other NO-OX-ID combinations with you, or write Dearborn Chemical Company.

Pipe Coating

in rough country is easy with

NO-OX-IDS

"Piping Hot," a new 16mm sound movie in color on the use of hot applied NO-OX-IDs by stationary machine, is available to companies, engineering clubs or technical societies. Write for booking.

Dearborn
Reg. U.S. Pat. Off.

THE LEADER IN RUST PREVENTIVES AND BOILER WATER TREATMENT

DEARBORN CHEMICAL COMPANY

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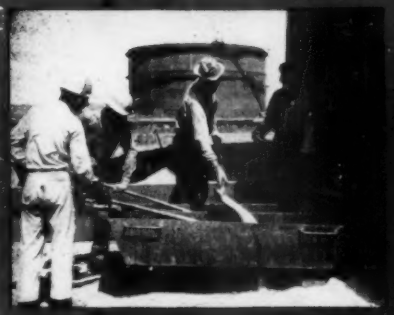
205 E. 42nd St., New York • 2454 Dundas St., West, Toronto

Let NATASCO solve your tank corrosion *Problems*



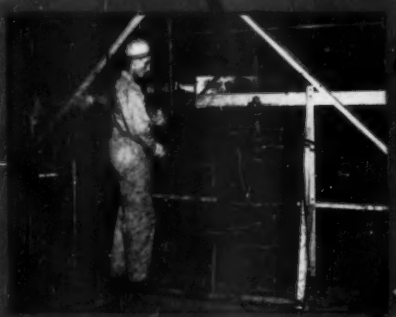
Natasco Corrosion Prevention Service for storage tanks keeps new tanks new and makes old ones give additional years of service. Scientific preparation of all surfaces and application is performed by experienced Natasco Crews.

EXPERIENCED PERSONNEL

Crewmen are trained in the correct preparation of tanks and application of specialized Natasco Products. Many Natasco Foremen have been with the company for from ten to fifteen years and their accumulated knowledge is your assurance of getting a satisfactory and long-life job.

SPECIALLY-MANUFACTURED EQUIPMENT

Manufacturers are called upon to develop and produce the special equipment, used by Natasco, for proper and economical application for Natasco Coatings.



LABORATORY-PERFECTED PRODUCTS

The Natasco Line of laboratory-perfected and field-tested products consists of eighteen products each having a specific application to corrosion problems and conditions. The use of the one — singly or in combination — is dependent upon the conditions in the area or the extent of corrosion on the tanks.

CALL NATASCO TO SOLVE YOUR CORROSION PROBLEMS.
WRITE FOR COMPLETE INFORMATION AND COSTS.

PROTECTS TANKS AGAINST CORROSION

THE Natasco COMPANY

P. O. BOX 1318 TULSA, OKLAHOMA

Lease Tank Service—West Texas Area
WILLIAMS CONSTRUCTION CO.
Odessa, Texas

California Representative
COAST CONTRACTORS, LTD.
4636 E. Slauson, Maywood, California

NOW...

...125 lb. S. P. BRONZE GLOBE, ANGLE and CHECK VALVES

Built to LUNKENHEIMER QUALITY STANDARDS

Fig. 2140 GLOBE
125 lb. S. P.
200 lb. W.O.G.

WANT a lower pressure valve to give the same dependable, low cost service you get in higher pressure LUNKENHEIMER Valves?

Here it is—New Fig. 2140 globe; Fig. 2141 angle; Fig. 2142 lift check; Fig. 2144 swing check. These valves feature Lunkenheimer's traditionally fine design and sturdy construction, plus exclusive silicon bronze alloy stems which eliminate stem thread failure due to wear.

Whatever your requirements for lower pressure service, you'll find these new valves unequalled for dependability and true economy.

Full details, including illustrations and dimensions, are given in Circular No. 582. Ask your Lunkenheimer Distributor for it or write direct.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO. U. S. A.

NEW YORK 13 CHICAGO 6 BOSTON 10 PHILADELPHIA 34
EXPORT DEPT. 318 322 HUDSON ST., NEW YORK 13, N. Y.

Your Lunkenheimer Distributor is stocking these new 125 lb. S.P. Bronze Valves. Call upon him for your original equipment, replacement and repair valve requirements.

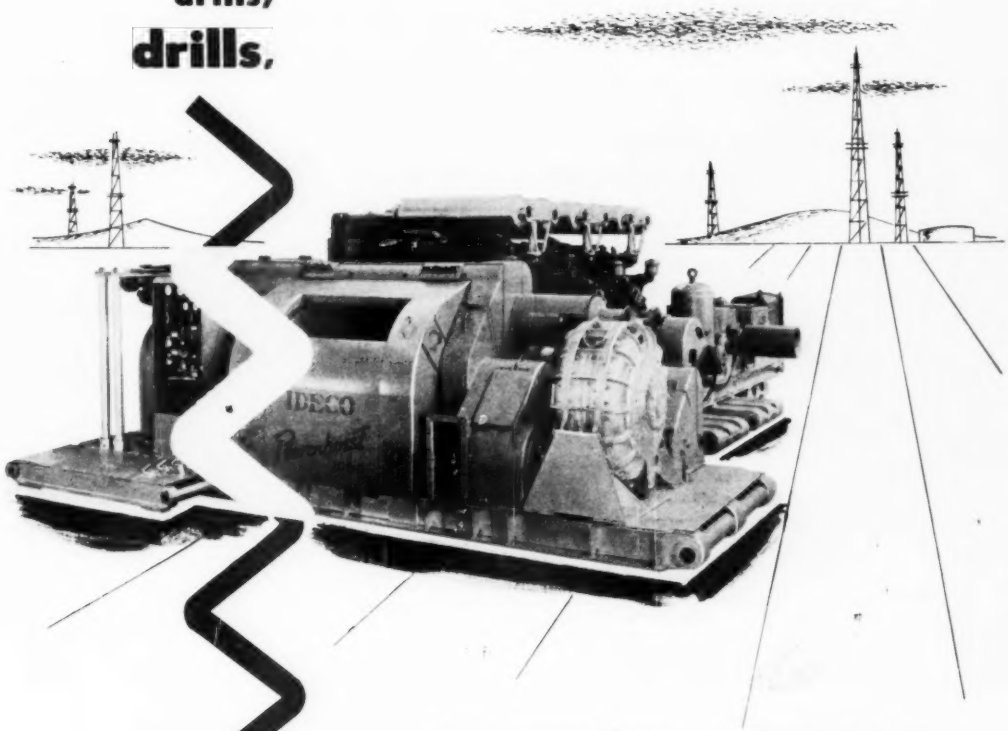
Fig. 2142 LIFT CHECK
125 lb. S.P. 200 lb. W.O.G.

Nowhere in the line is dependability more important than in Check Valves. These Checks function quickly and positively, seat accurately and tightly.

Fig. 2141 ANGLE
125 lb. S.P. 200 lb. W.O.G.

Fig. 2144 SWING CHECK
125 lb. S.P. 200 lb. W.O.G.

the rig that drills,
drills,
drills,
drills,



runs smoother . . . longer on SKF Spherical Roller Bearings

Ideco's PR-1050 power rig is a fully air-operated, heavy-duty, deep drilling assembly that has a high degree of mobility . . . efficient, fast operation. And SKF Spherical Roller Bearings play an important part in the unit's ability to work around the clock with a minimum af maintenance and attention.

That's because these high quality, self-aligning bearings are built to take it . . . heavy radial, thrust or combined loads.

There's an SKF Spherical Roller Bearing to meet every requirement. Our engineers can show you the most economical way to apply bearings to your equipment. Write: SKF Industries, Inc., Philadelphia 32, Pa.

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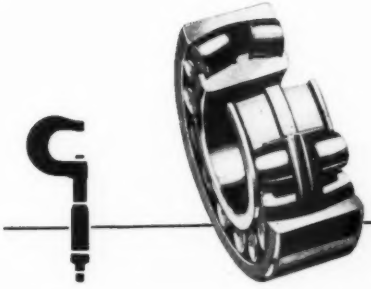
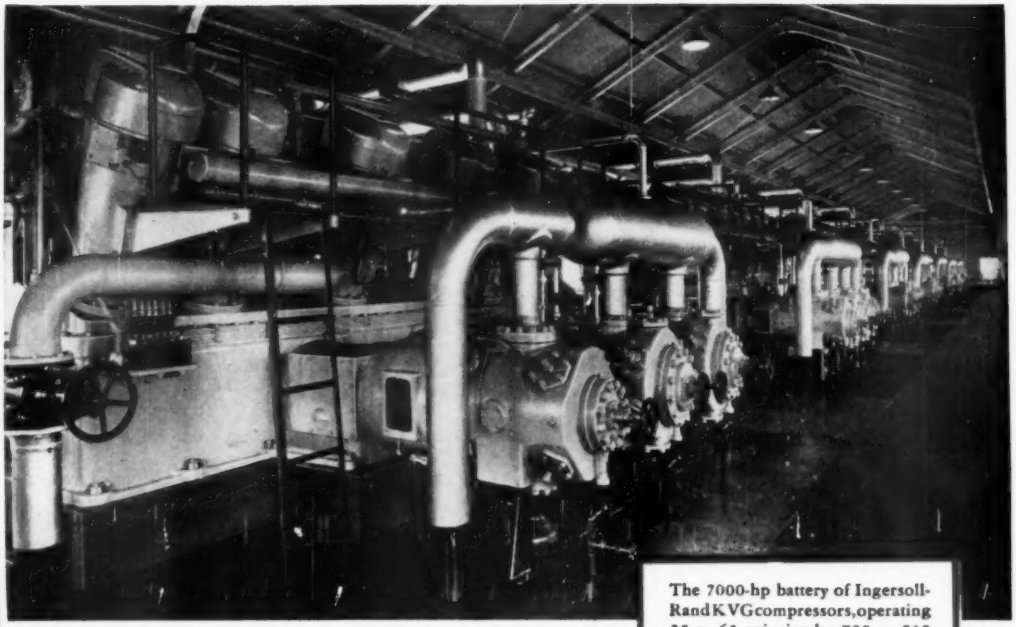
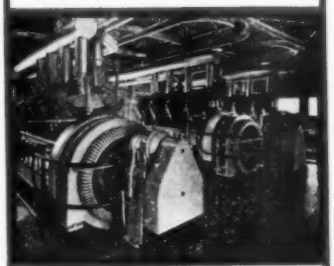


Industrial bearings engineered by SKF

For GAS CONSERVATION
depend on Compressors like these



The 7000-hp battery of Ingersoll-Rand KVG compressors, operating 35 to 65 psig intake, 700 to 810 psig discharge, at the Anahuac extraction plant of a large oil company.



Three I-R 370-hp Type PVG gas-engine-generator units installed in the same plant.

In the Anahuac gasoline-extraction plant of a large oil company these 7 Ingersoll-Rand 1000-hp KVG gas-engine-driven compressors gather and compress casinghead gas from producing oil wells. The gas is "stripped" of its liquid content, and the high-pressure residue gas is distributed by pipe line to various industrial centers where it is fully utilized. This is a typical phase of a 17-year old *gas-conservation program* that you in the Petroleum Industry have been waging with increasing determination and success.

The compressors, as well as the gas-engine-generator units (right) in the same plant, are of Ingersoll-Rand 4-Cycle V-design. This design is not new to the oil company's engineers. They have been using 4-Cycle V-compressors and gas engines in various services during a 12-year period.

No matter what your load, pressures, or speed, Ingersoll-Rand 4-Cycle Vees are the logical choice for *dependability, economy,* and *operating flexibility* . . . in refinery, cycling, repressuring and pipe-line services.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 384-6

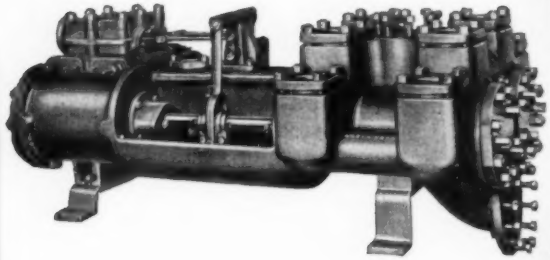
4-CYCLE

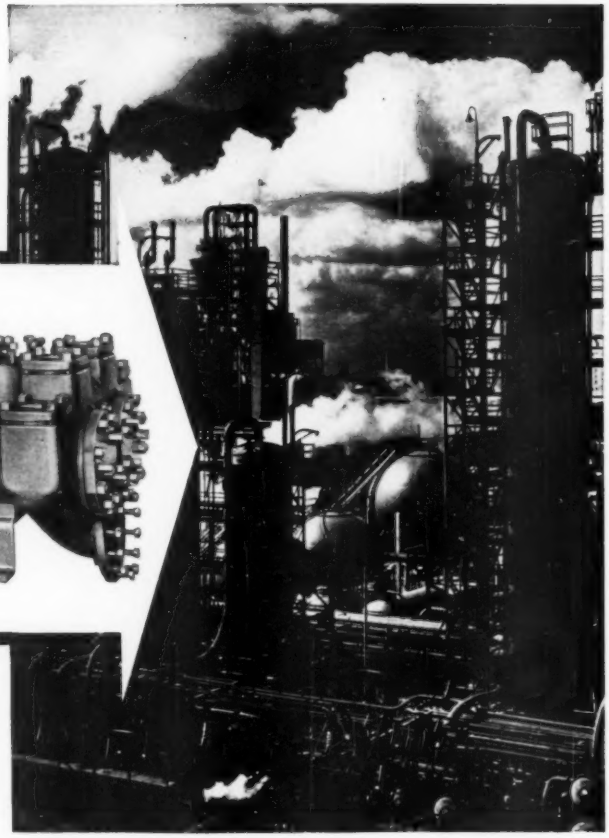
COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

New Places for
PREFORMED
WIRE ROPE
Men who build new machines and men who run old ones know that Preformed Wire Rope is an efficient, economical and dependable medium for transmitting motion.
BECAUSE—
• Preformed lasts longer
• Preformed handles easier
• Preformed is safer to use
• Preformed saves installation time
Now is the time to take advantage of the savings Preformed wire rope offers. Ask your supplier about it. Then specify Preformed wire rope on your next order.

Right...

WHERE IT BELONGS!





The Worthington Horizontal Duplex Side Pot Pump is Designed Especially For Refinery Service

Ever since the first refinery started, Worthington has been custom-designing pumps for petroleum processing, giving full consideration to every factor — viscosity, vapor pressure, entrained gas, suction conditions, etc. — that enters into refinery pumping requirements. You see a typical result of this long, specialized experience in the Worthington Type PRL, a horizontal duplex side pot steam pump, a top performer in refineries the country over.

Ready For Action

Normally built for cold oil service, the Type PRL comes to you thoroughly equipped for the job. There are no costly "extras" to buy . . . because such essential features as "NiResist" liquid cylinder liners, stainless steel liquid piston rods and valves, lantern glands and extra deep stuffing boxes are all standard. Where required, Worthington cup pistons and packing, and "Rollo" semi-spherical valves are available. For hot oil service, the PRL can be equipped with cast steel liquid cylinders, water jackets, and wing valves.

Built To Last

As durable as it looks, the PRL is rugged inside and out, with every part designed to give you the years of money-saving, trouble-free experience that proves *there's more worth in Worthington.* Get further facts, about this specialized pump. Write to *Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.*

WORTHINGTON

PR-8

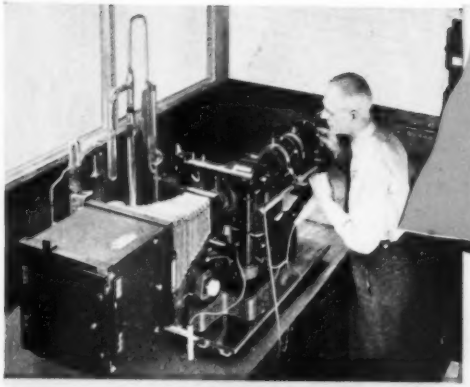
THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

Save the threads and you save your pipe . . . use a THREDKOTE Compound on all threaded connections . . . it will give you 3-point service . . . 1, it seals; 2, it lubricates; 3, it's rust preventive . . . there's a Thredkote Compound for every threaded joint in the oil industry.

Thredkote 701 for extreme pressure connections, oil well casing and tubing, tool joints.
Thredkote 702 for Christmas Tree assemblies, steam lines.
Thredkote 705 for extreme and high pressure connections.
Thredkote 708 for air lines, bolted tanks, gas and gasoline lines, gasket seals, oil well casing and tubing, permanent sealer.

THREDKOTE
REGISTERED U. S. PAT. OFF.

For sale by Humble Oil & Refining Co., and leading oil industry supply houses.



Determining Thermal Characteristics

You Get Better Alloy Piping Because of OUR METALLURGICAL COMMITTEE

Whenever you order alloy piping from a Qualified Fabricator, you benefit by the past and continuing research conducted by the Metallurgical Committee of the Pipe Fabrication Institute. This research deals extensively with the behavior of alloys during the various fabricating operations, and under the service conditions to which they are subjected. The committee coordinates both individual and collective research programs . . . aids in disseminating currently all available information. It represents an organized, carefully directed effort toward the continuous improvement of alloy pipe fabrication. This is only one of many reasons why alloy piping prefabricated by a Qualified Fabricator is better piping.

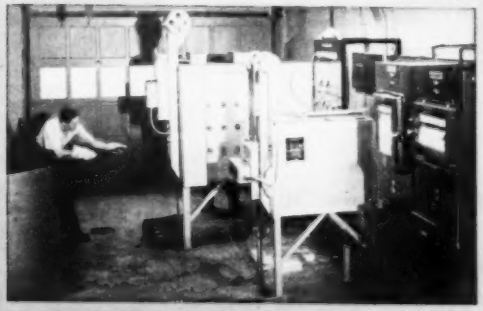
Electro Chemical Analysis

THE PIPE FABRICATION INSTITUTE

Devoted to the Technical and Economic Problems in Piping

1108 CLARK BUILDING PITTSBURGH, PA

Creep Testing



Heat Treatment Determination

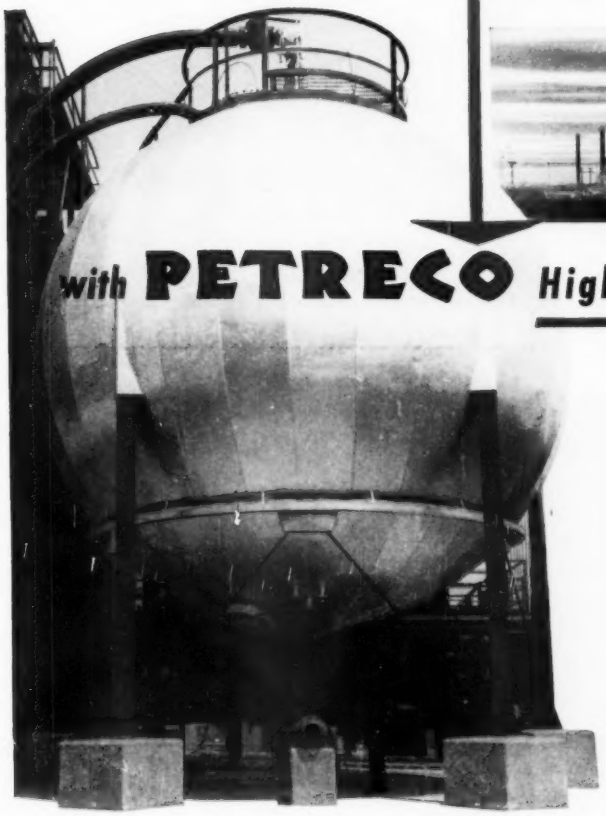
Radiographic Inspection

Hardness Testing

3641

INSURE MAXIMUM REFINERY PERFORMANCE

longer continuous runs
decreased coking troubles
no salt plugging, less HCL corrosion
full use of maximum refining capacity



with PETRECO *High Efficiency Desalting*

PETRECO Electric DESALTERS assure maximum salt removal, because they are kept at top efficiency through PETRECO SERVICE, which also provides

PROVED ENGINEERING DESIGN • CONTINUING PROCESS IMPROVEMENT RESEARCH • REGULAR EFFICIENCY CHECKS • THOROUGH EQUIPMENT INSPECTIONS • API-ASME CODE EQUIPMENT • TRAINED AND EXPERIENCED PERSONNEL • LABORATORY TESTING COOPERATION • COMPLETE REPLACEMENT PART STOCKS • EMERGENCY REPAIR SERVICE ON 24 HOUR CALL

Only Petreco offers complete desalting service personnel and facilities.

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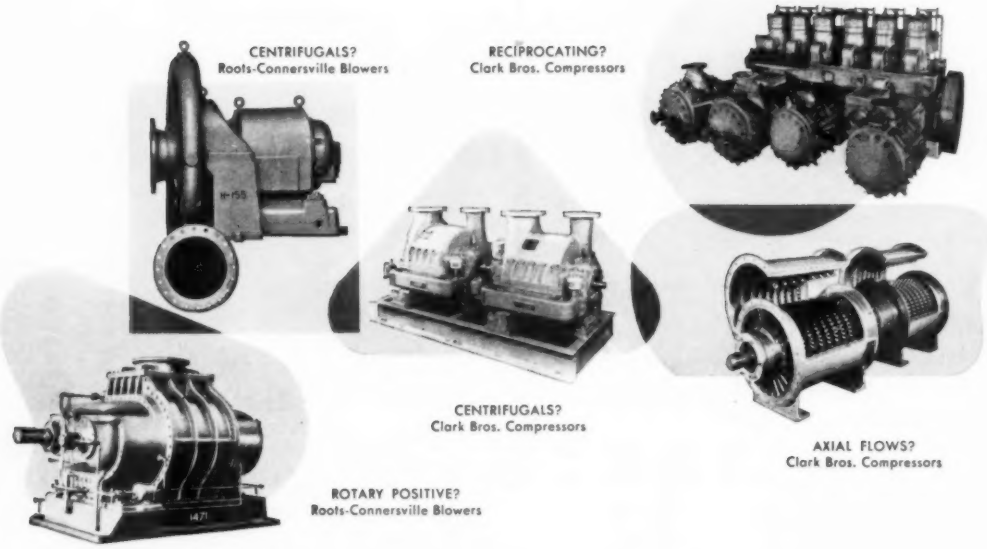
530 W. 6th STREET • LOS ANGELES 14, CALIF.

PETRECO

SPECIALIZED *Electric* PETROLEUM PROCESSES { **DESALTING** / **DEHYDRATING**

PR 49-3



AT AREAS OF OVERLAP

BUY ENGINEERING FORESIGHT, NOT SALESMANSHIP

Why should Dresser Industries offer so many *types*, with complete ranges? Because they are not substitutes, even where they overlap. Each has advantages. However, there are overlapping conditions where either one of two types might serve.

If you deal with a salesman who sells only one of these types, you can be sure right now that HIS will be offered as the only type you should use. Maybe it's not so. Dresser Industries avoids this temptation to compromise for the sake of a sale. If a Dresser sales-engineer encounters an area of overlap, he is equipped to use foresight and unbiased judgment. And that saves you money.

Before buying any equipment, write for comparative data on the complete, overlapping line of Dresser Industries' blowers and compressors. Learn the facts on the new Axial Flow complete line. State which type you think comes closest to your needs. Write to Dresser Industries, Inc., Terminal Tower, Cleveland 13, Ohio.

DRESSER INDUSTRIES LINE

R-C ROTARY POSITIVE BLOWERS

discharge pressures up to 10 p.s.i.
10 CFM to 50,000 CFM

R-C CENTRIFUGAL BLOWERS

discharge pressures up to 40 p.s.i.
2,000 CFM to 100,000 CFM

CLARK CENTRIFUGAL COMPRESSORS

discharge pressures above 40 p.s.i.
1,500 CFM to 120,000 CFM
up to 25,000 BHP and 12,000 R.P.M.

CLARK AXIAL FLOW COMPRESSORS

discharge pressures up to 150 p.s.i.
20,000 CFM to 300,000 CFM
3,000 BHP to 30,000 BHP

CLARK RECIPROCATING R A COMPRESSORS

discharge pressures up to 10,000 p.s.i.
Figures include Big Angle, Right Angle and Midget lines.
2, 3, 4, 5, 6, 8, 10 cylinders
gas-engine driven—75 to 2,200 BHP
steam-engine driven—500 to 4,000 BHP

SEMI-PORTABLE MIDGET ANGLE

2, 4, 6, 8 cylinders
75, 150, 225 and 300 BHP, respectively.

State your probable requirements and write for comparative literature. Get the complete details on all equipment covering the range of your needs. Are you fully posted on Axial Flows? On Semi-Portables? On Roots Centrifugals? Write for booklets on each. Dresser Industries, Inc., Terminal Tower, Cleveland 13, Ohio.

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Better **WATER SERVICE...**

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Elevated Steel Tanks

Completely dependable water service for general plant use—including storage of cooled water and other process applications—combines with ever-present fire protection to create immediate value in your Pittsburgh-Des Moines Elevated Steel Tank. Year-after-year durability and low maintenance costs are P-DM values that steadily enhance your investment. *May we give you the details?*

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SEATTLE . . . . . 906 Lane Street
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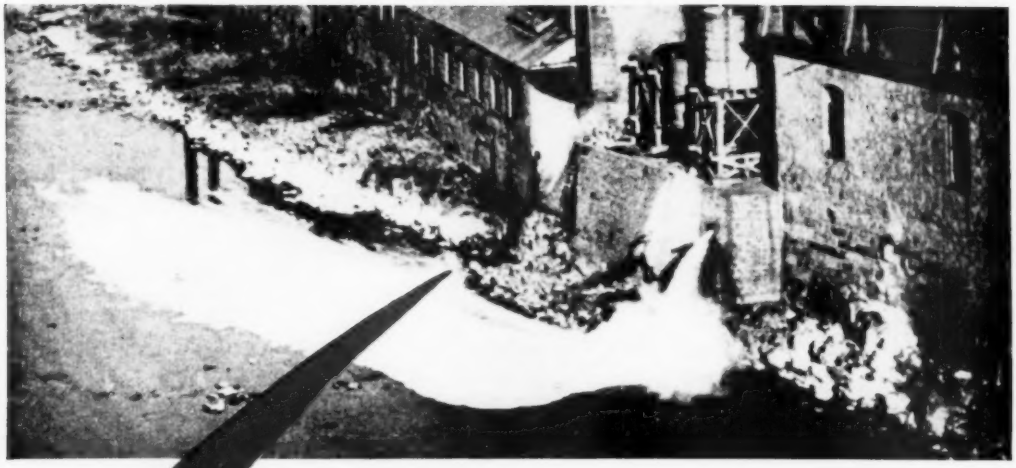

General Chemical "ALUM"

For Treatment of Industrial Wastes

Treatment of industrial wastes to prevent harmful effects on public waters is becoming increasingly important. Throughout the process industries, scores of concerns have found a solution to their problem in the use of General Chemical Aluminum Sulfate.

Laundries, paper mills, dairies, textile mills, canning plants, oil wells and packing houses across the nation report General Chemical "Alum" useful in purifying wastes; coagulating and settling suspended matter; reducing coloring matter, including many dyes.

Fifty years of working with the water industry on chemical methods of clarifying water has given General Chemical extensive experience in the treatment of sewage and waste waters. This broad knowledge may be of value to you as it has to so many others.

Assistance of the company's technical service specialists is available on request—and without obligation. For help on your industrial waste treatment problems, write or phone the nearest General Chemical office.

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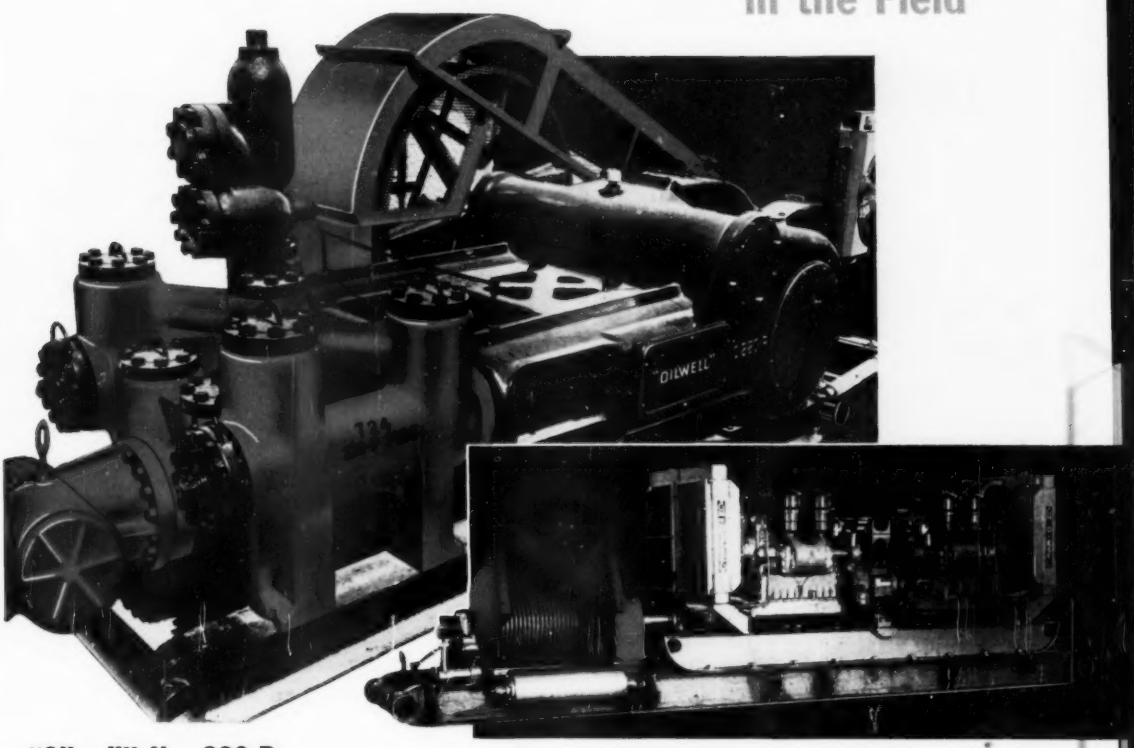
Compact...Portable... Easily Aligned in the Field



"Oilwell" No. 220-P

(8"x20") Duplex Pump *with* The "Oilwell" No. 500 G. M. Power Drive

BUILT FOR DEEP-WELL DRILLING – The "Oilwell" No. 220-P Duplex Power Pump was designed to meet the demand for greater mud volume and higher pressures. High-capacity power and fluid ends for 600 H.P. input embody all the time-proved features that have made the "Oilwell" line of power pumps so popular.

An independently powered slush pump affords greater operating flexibility – permitting variations in pump speeds which will provide the pressures and volumes required. With this hook-up the slush pump operates individually without effecting rotary drilling speeds. Greater flexibility is also provided in locating the slush pump with relation to the draw works—an important factor on barge rigs or marine locations. In addition, the No. 220-P Pump may be easily and quickly disconnected for moving.

Displacement (Rod Deducted) and Pressure Range

Available Liner Sizes	5-in	6-in	6 1/2-in	6 3/4-in	7-in	7 1/4-in	7 1/2-in	*8-in
Theoretical G.P.M. at Recommended (50) R.P.M.	300	455	530	575	620	670	770	830
Theoretical G.P.M. at Maximum (60) R.P.M.	355	535	635	695	750	810	930	990
Maximum Working Pressure P.S.I.	2450	1625	1370	1260	1165	1080	940	880

*Unless otherwise specified, pump is regularly furnished with 7 3/4-in. Liners.

Call your nearest "Oilwell" representative for Complete Pump and Drive specifications.

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USS "OILWELL"

UNITED STATES STEEL

How do your high temperature tubes stack up for LIFE/COST ratio?

PERHAPS your tubes are doing their job, but are they doing it at the lowest possible cost? It will pay you to look into these twelve Timken® high temperature steels . . . "tailored" to fit your requirements. They are specially developed to cope with specific problems of heat, pressure, corrosion, and oxidation. And *one* of them offers you the best life/cost ratio for your job.

Timken metallurgists, backed by 19 years of experience and research in high temperature applications, are qualified to recommend the one steel that will give you the service life you need at the lowest possible cost. The Timken Technical Staff, recognized authorities in the fie'd, will be glad to help you with your high temperature tube problems.

Whichever analysis is selected, you can be assured of uniform high quality steel from shipment to shipment. The Timken Company insures this uniformity through complete and careful quality control from melt shop through final inspection.

Call on the Timken Technical Staff now for help in choosing the most efficient high temperature tube with the best life/cost ratio for you. There's no obligation. Write today to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN 18-8 STEEL TUBING Shows the best combination of creep strength, oil corrosion resistance and oxidation

TIMKEN SICROMO 9 M STEEL TUBING This steel possesses the maximum corrosion resistance of any of the

TIMKEN SICROMO 7 STEEL TUBING For applications requiring better corrosion resistance than can be obtained with 5%

TIMKEN SICROMO 5 S STEEL TUBING For oxidation resistance to 1500°F. Good creep strength and corrosion re-

TIMKEN 4-6% CR MO STEEL TUBING For service up to 1200°F. Superior corrosion resistance. Less oxidation resistance

TIMKEN SICROMO 3 STEEL TUBING For service up to 1200°F. Has excellent oxidation resistance and good corrosion

TIMKEN 2¼% CR-1.0% MO STEEL TUBING For service up to 1150°F. Has greater resistance to creep than 2% Cr.

TIMKEN SICROMO 2 STEEL TUBING For service up to 1200°F. where better scale resistance is required than can be

TIMKEN 2% CR ½% MO STEEL TUBING For service up to 1150°F. Intermediate corrosion resistance plus good

TIMKEN DM STEEL TUBING For service up to 1150°F. This steel offers out-

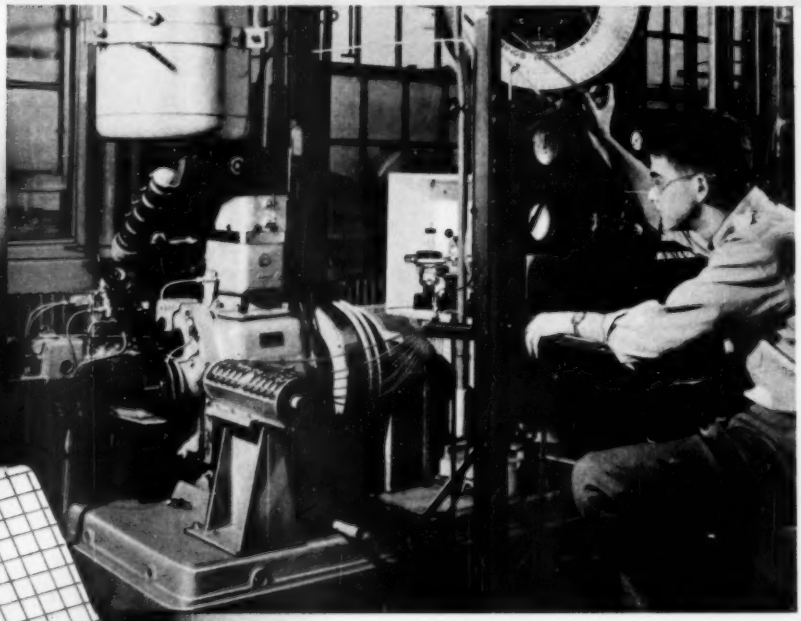
TIMKEN CARBON-MO STEEL TUBING For temperatures up to 1000°F. Improved creep strength makes it safer

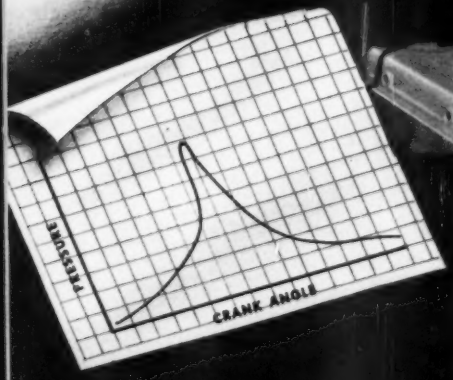
TIMKEN CARBON STEEL TUBING Generally for service not exceeding 900°F., where corrosion and oxidation

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

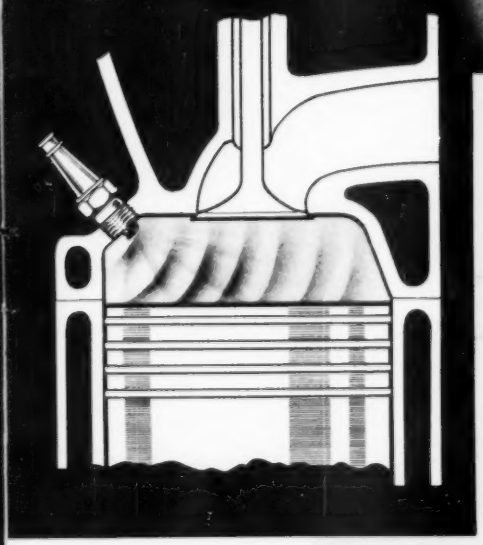
Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

DU PONT TETRAETHYL LEAD COMPOUNDS





Standard engines are frequently altered for special studies. This Modified F-4 engine is being used to investigate effect of various engine factors on combustion.



Du Pont Research

at Work on Fundamental Combustion Studies

Further advances in the chemical control of combustion will, undoubtedly, come from a better understanding of the burning process. For this reason an important phase of Du Pont research on tetraethyl lead and other anti-knock agents is devoted to fundamental combustion studies.

These studies are providing Du Pont chemists, engineers, and physicists with a better understanding of the laws governing the release of energy from hydrocarbon-air mixtures. Many basic problems are being investigated. A few typical studies are those of pre-combustion reactions, the mechanism of flame propagation and the knocking characteristics of fuels with respect to temperature, pressure and time.

This is another example of Du Pont research at work on problems of interest to the refiner—research aimed at helping you create improved fuels, for today and for the future.

DU PONT
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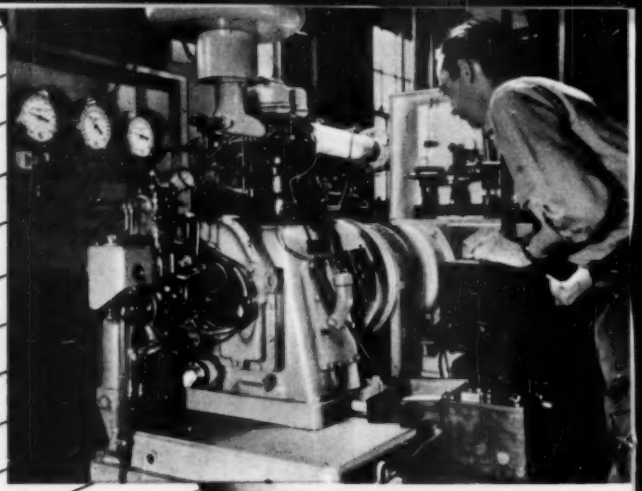
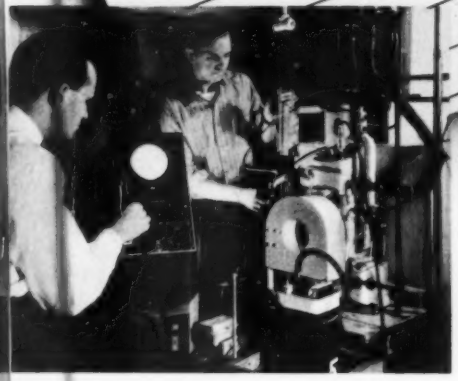
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Research... to help every refiner



Many basic combustion studies are made in single cylinder engines.



Small single cylinder engines are used for many preliminary investigations. In this test the engineer is using manifold injection as a tool in the study of combustion.

Often, special instrumentation must be designed and built to record data not obtainable with standard equipment. This technician is checking a new piece of electronic apparatus before use.

Du Pont's research program on TEL and other anti-knock agents is an integrated program involving chemical, physico-chemical and engineering research. Fundamental combustion studies are a necessary part of this investigation of fuels and anti-knock agents.

These studies develop basic information on the behavior of fuels in engines. This information helps, in turn, in the search for new materials.

In this and other research projects, Du Pont is working toward a better understanding of combustion control, a subject of vital concern to every refiner. Information developed will contribute to improved additives and fuels—today and in the future.

DU PONT
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Better Things for Better Living... *Through Chemistry*

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES . . .

Tetraethyl Lead Compounds
Motor Mix—Aviation Mix
Antioxidants
Metal Deactivator — Dyes

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PETROLEUM CHEMICALS DIVISION
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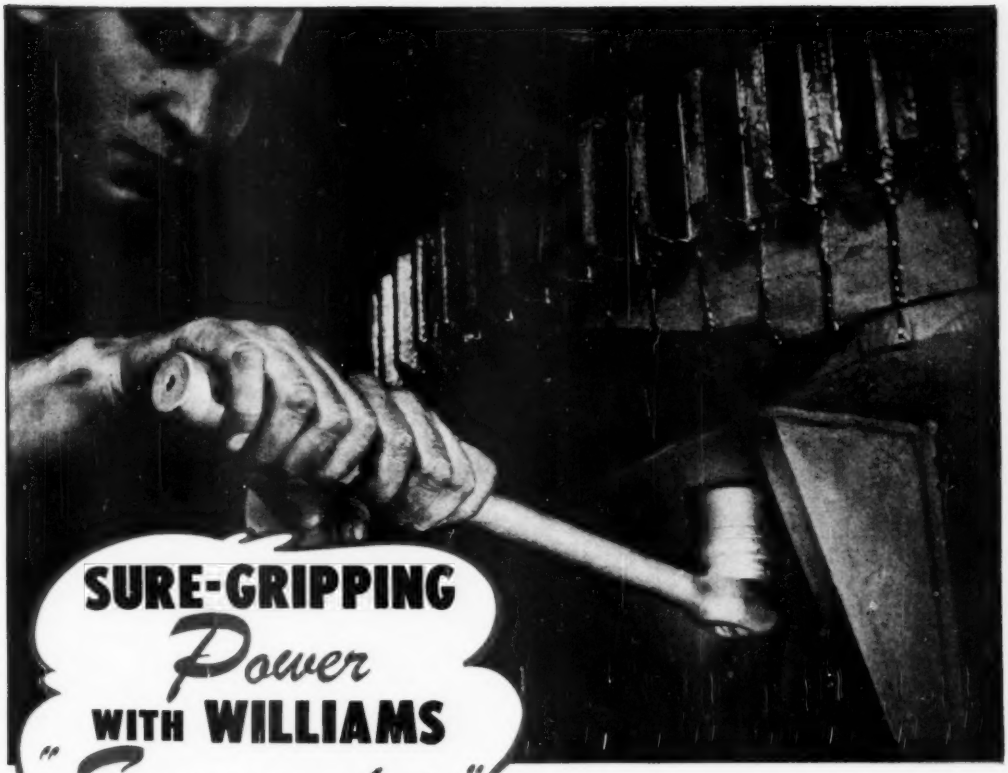
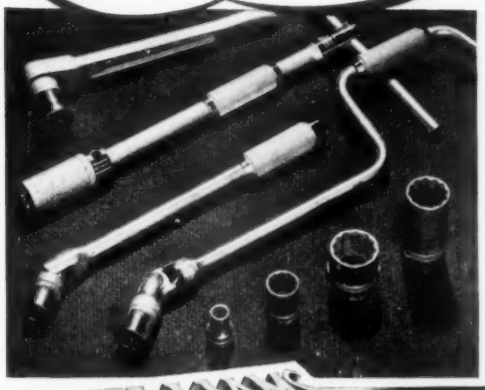


SURE-GRIPPING *Power* WITH WILLIAMS *"Supersockets"*



● For the extra *safety* and the extra *power* that's possible only with a sure-gripping wrench . . . pick a Williams "Supersocket." And there are many other advantages to be found in these versatile wrenches . . . greater speed, extreme adaptability, less fatigue are but a few.

Williams "Supersockets" are available in 5 different patterns, having various handles, parts and socket types, with drives ranging from 1/4" to 1" square. Socket openings from 3/16" to 3-1/8".

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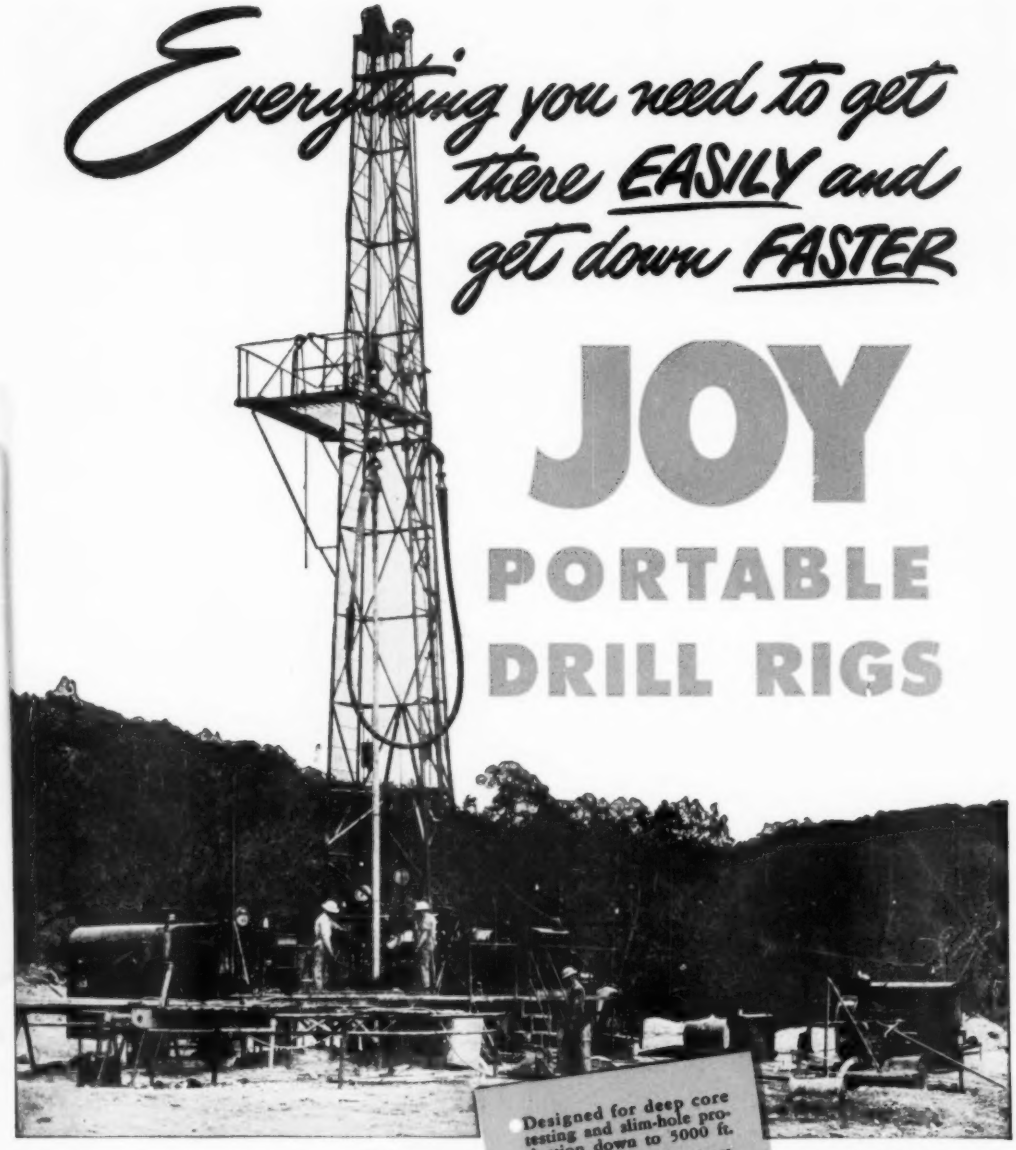
Everything you need to get there EASILY and get down FASTER

JOY
PORTABLE DRILL RIGS



- Designed for deep core testing and slim-hole production down to 5000 ft.
- Compact and highly portable.
- Ruggedly built for heavy-duty field service.
- Other JOY Drill Rigs for any need.

Reduce your costs with the No. 300 MOTORIZED DRILL RIG, illustrated

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Raymond's successful experience for more than a half century has thoroughly proved these six outstanding advantages of Raymond Concrete Piles. These benefits, plus Raymond's expert personnel and specialized equipment, result in sound, dependable substructures that meet every requirement. You are invited to consult our engineers for the facts.

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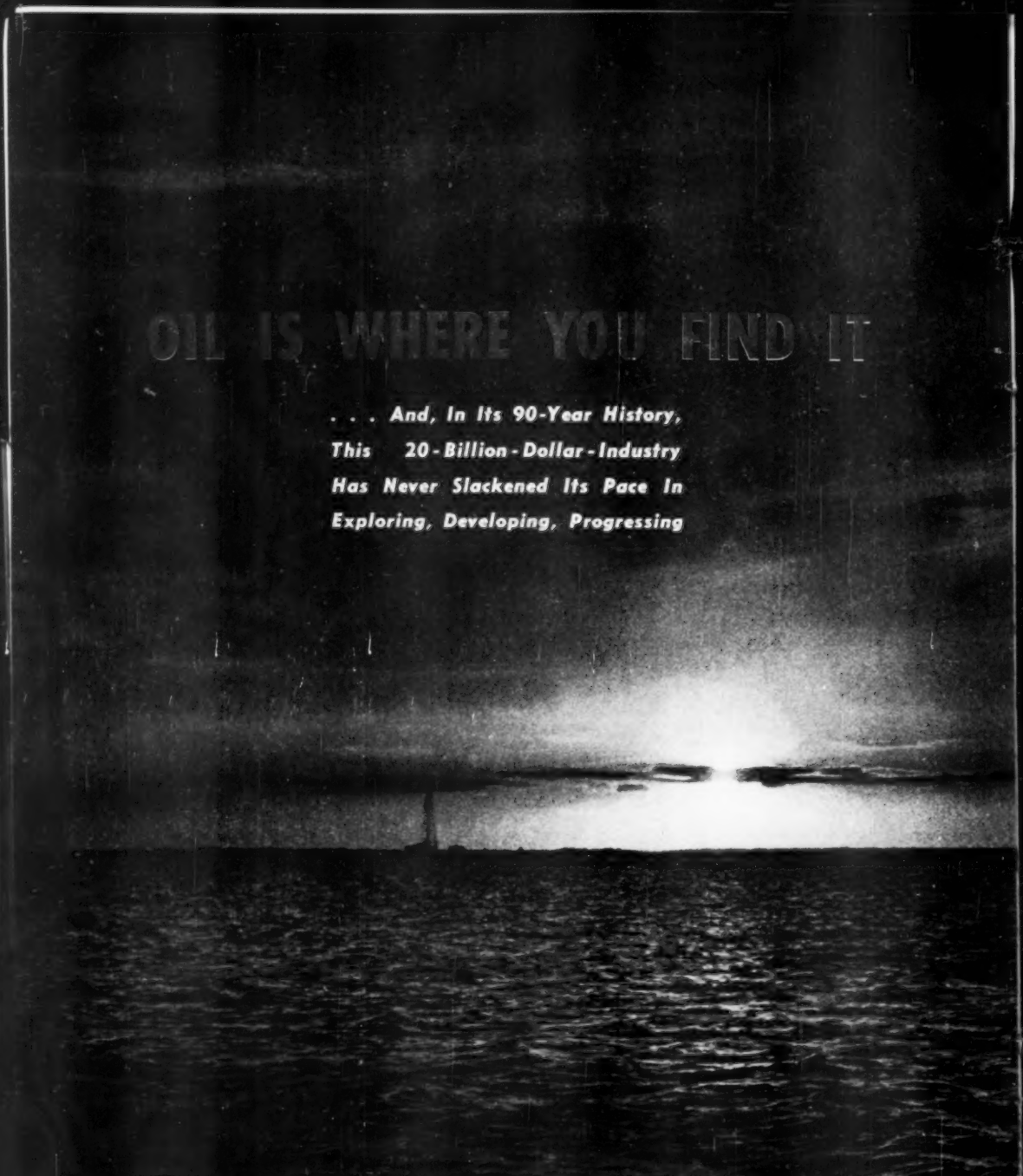
AROUND THE WORLD

52 YEARS FOUNDED 1897 OF PROGRESS

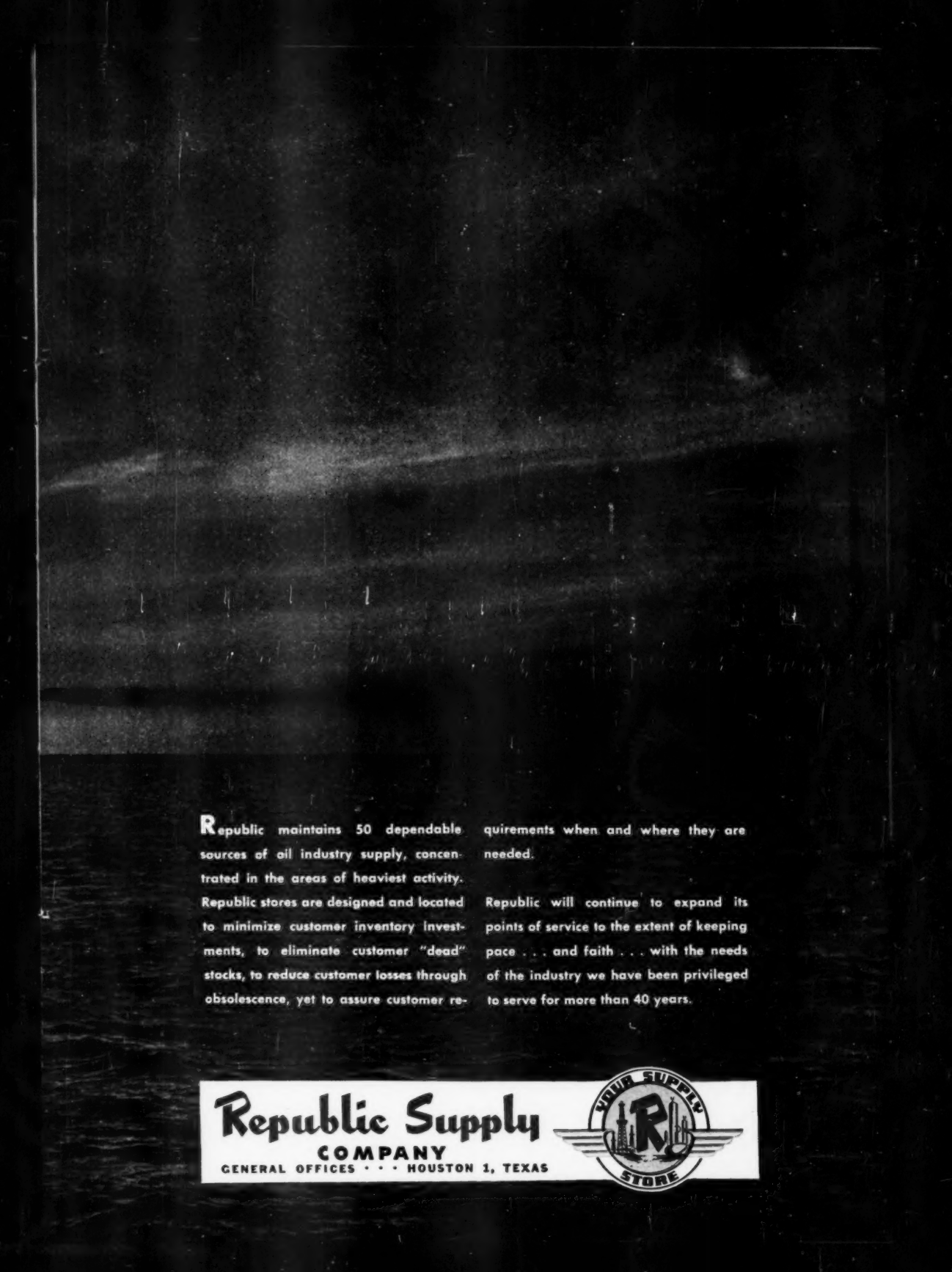
THE SCOPE OF RAYMOND'S ACTIVITIES

Includes every recognized type of pile foundation—concrete, composite, precast, steel, pipe and wood. Also caissons, underpinning, construction involving shore protection, shipbuilding facilities, harbor and river improvements and borings for soil investigation.


OIL IS WHERE YOU FIND IT
. . . And, In Its 90-Year History,
This 20-Billion-Dollar-Industry
Has Never Slackened Its Pace In
Exploring, Developing, Progressing

Republic Sales and Service Points STORES: ARKANSAS — El Dorado; ILLINOIS — Grayville, McLeansboro, Salem; KANSAS—Ellinwood, Russell; LOUISIANA — Haynesville, Lake Charles, New Iberia, Rodessa, Shreveport; MISSISSIPPI — Hattiesburg, Jackson; NEW MEXICO—Artesia, Eunice, Hobbs; OKLAHOMA—Cement, Elmore City, Oklahoma City, Seminole, Tulsa; TEXAS — Abilene, Alice, Big Spring, Borger, Columbus, Corpus Christi, Electra, Falfurrias, Freer, Hebbronville, Houston, Kamay, Kenedy, Kermit, Kilgore, McAllen, Nocona, Odessa, Olney, Pampa, Pleasanton, Sundown, Talco, Victoria, Wichita Falls; WYOMING—Casper.

SALES OFFICES: COLORADO—Denver; ILLINOIS — Chicago; KANSAS—Wichita; OKLAHOMA — Bartlesville; TEXAS—Dallas, Fort Worth, San Antonio.



Republic maintains 50 dependable sources of oil industry supply, concentrated in the areas of heaviest activity. Republic stores are designed and located to minimize customer inventory investments, to eliminate customer "dead" stocks, to reduce customer losses through obsolescence, yet to assure customer requirements when and where they are needed.

Republic will continue to expand its points of service to the extent of keeping pace . . . and faith . . . with the needs of the industry we have been privileged to serve for more than 40 years.

Republic Supply
COMPANY
GENERAL OFFICES • • • HOUSTON 1, TEXAS

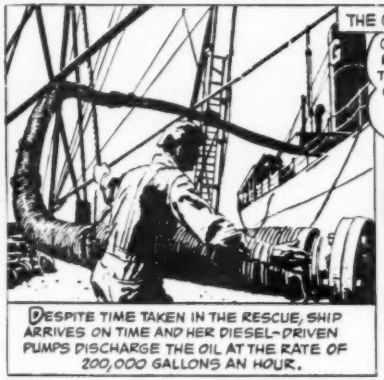
YOUR SUPPLY R STORE

GULF TANKERS
go 18 months between overhauls with
KOPPERS PISTON RINGS

ROMANCE, RESCUE and 'BLACK GOLD'
GULF OIL TANKERS COMBINE ALL IN A DAY'S WORK!
ON THE TROPICS AT PUERTO LA CRUZ, VENEZUELA, THE GIANT TANKER, GULFPRIDE, LOADS HER PRECIOUS CARGO OF "BLACK GOLD" FOR THE REFINERY IN PHILADELPHIA, 2300 MILES AWAY.
THREE DAYS OUT, AND PLOWING NORTH WITH 6½ MILLION GALLONS OF OIL IN HER TANKS, THE TANKER PICKS UP A FRANTIC S.O.S., CHANGES COURSE AND FULL SPEED AHEAD.

HARD RIGHT RUDDER, SLOW AHEAD. STAND BY TO LOWER STARBOARD LIFE BOATS
HER 2500 H.P. DIESEL ENGINES WORKING AT PEAK POWER PUSH THE 20,000 TON SHIP AT TOP SPEED. THE SURVIVORS ARE SIGHTED!

A LIFE BOAT IS SENT OVER, AND A DANGEROUS SEA RESCUE IS EFFECTED. GRATEFUL SURVIVORS ARE GIVEN HOT DRINKS AND MEDICAL ATTENTION...AND THE GREAT TANKER IS ON HER WAY AGAIN, NO TIME FOR PLAUDITS.


DESPITE TIME TAKEN IN THE RESCUE, SHIP ARRIVES ON TIME AND HER DIESEL-DRIVEN PUMPS DISCHARGE THE OIL AT THE RATE OF 200,000 GALLONS AN HOUR.

THE GULFPRIDE'S CHIEF ENGINEER SAYS:
OUR SCHEDULES DEMAND CONTINUOUS ROUND TRIPS FROM THE TROPICS TO THE NORTH WITH 18 MONTHS BETWEEN OVERHAULS. THAT'S WHY WE SPECIFY KOPPERS PISTON RINGS IN ALL OUR DIESELS

KOPPERS PISTON RINGS have won their reputation the hard way . . . in the tough service of ocean-going tankers and tugs, high-speed streamliners, overloaded pumping engines.

Where dependability and economy are essential, you'll find engine builders and operators specifying Koppers American Hammered Rings. The reason for their superlative performance is simple. They embody the two greatest developments in piston rings . . . Porous Chrome* and K-Spun.

Take a look at the important features listed at the right. Then take a step toward longer ring life and better service. Check with Koppers engineers now. Koppers Company, Inc., Piston Ring Dept., Box 626, Baltimore 3, Maryland.

*VAN DER HORST PROCESS

WHAT POROUS CHROME PLATING AND K-SPUN METAL MEAN TO YOU

1. Guaranteed against ring breakage. Tensile strength double ordinary gray iron castings.
2. All rings seat immediately without scuffing and scoring.
3. Ring and cylinder wear greatly reduced.
4. Fifty percent more elasticity retains shape and tension far longer.
5. Four times greater impact strength means long life in severe service.

KOPPERS

American Hammered

KOPPERS PISTON RINGS

From a simple bend to prefabricated piping complete for the most elaborate and complex job . . . Midwest Piping will meet your requirements exactly. The four Midwest Plants, strategically located, are staffed by experienced piping specialists working with the most advanced equipment.

Midwest modern methods assure prefabricated piping that meets the most difficult conditions . . . is accurate in dimension and alignment . . . carefully shop tested . . . heat treated and stress relieved when necessary . . . thoroughly cleaned and inspected. Midwest Piping is delivered to the job in a series of sub-assemblies that minimize erection time, trouble and cost. You will find it to your advantage to get in touch with Midwest whenever you need piping.

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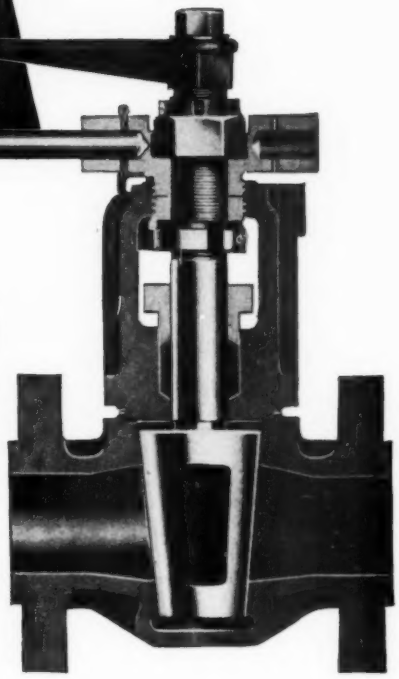
MIDWEST PIPING IS *BETTER* PIPING

What do you want in a Valve?

✓Instant Stick Proof Operation?
✓Opened or Closed by a Quarter Turn?
✓Positive Seal without lubrication?
✓Protected Seating Surfaces?
✓Unobstructed Straight-Line Fluid Flow?

Then you want

HOMESTEAD *LEVER-SEALD* VALVES

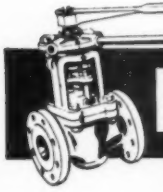


Built into each valve is a powerful lever-and-screw device that prevents sticking and assures positive action at all times and under all conditions. Corrosive or viscous fluids, extremes of temperature or pressure or other adverse operating conditions that cause ordinary valves to fail cannot affect Homestead Lever-Seald Valves.

Operation is simple and easy. Seating pressure is first relieved with the lower lever just enough to overcome friction. Then a quarter-turn of the upper lever fully opens or closes the valve. Full seating pressure is again applied with the lower lever to make a positive, leakless seal. They operate faster, too . . . 16 to 28 times faster than screw-stem-type valves. The quarter-turn principle makes them ideal for installation in restricted areas, next to walls, floors, ceilings, congested piping and other obstructions where many other types of valves could not be operated.

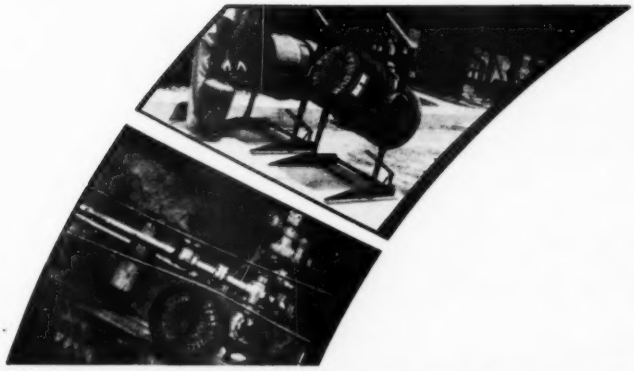
Homestead Lever-Seald Valves are available in combinations of metals and alloys to meet your service requirements. Sizes range from 1½" to 10" for pressures from vacuum to 1500 pounds.

For complete details write for Valve Reference Book No. 38 . . . today.



HOMESTEAD *LEVER-SEALD VALVES*

HOMESTEAD VALVE MANUFACTURING CO. · P. O. BOX 403, CORAOPOLIS, PENNA.



RECOGNIZED ABILITY

Tretolite's ability to provide the maximum in service and dehydrating effectiveness is demonstrated by the fact that more oil is treated by Tret-O-lite than by any other dehydrating method.

The Tretolite service engineer in your field will be glad to demonstrate Tret-O-lite's effectiveness—just call him.

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Manufacturing Chemists

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DEHYDRATING | DESALTING

STRENGTH

SPEED

you get both with

REX 3125 CHAIN

● With its relatively short pitch ... 3⅛" ... Rex 3125 Chain permits operation at far higher speeds than the longer pitch rotary chains, yet it has far greater load-handling capacity than any other drawworks chain.

Available in single and multiple widths, these high speed, high strength chains are sturdily built of highest quality steels.

The Rex Unit Link is put together to stay ... to stand up under the terrific stresses and strains of oil field service. All parts, pins, bushings, rollers and side bars are accurately heat treated in the most modern furnaces to develop maximum strength and resistance to wear.

Your Rex Field Engineer or your local supply store will be glad to show you how you can get lower chain cost per foot of hole drilled with Rex 3125 Chains. Or if you prefer, write direct to Chain Belt Company, 1619 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

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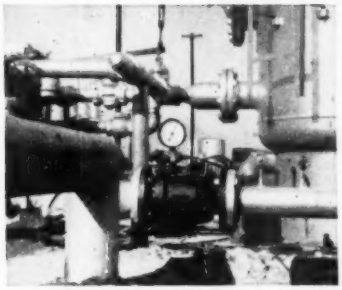
the chains that have grown up with the oil fields

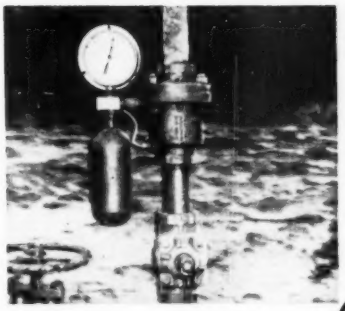
IF YOU WANT

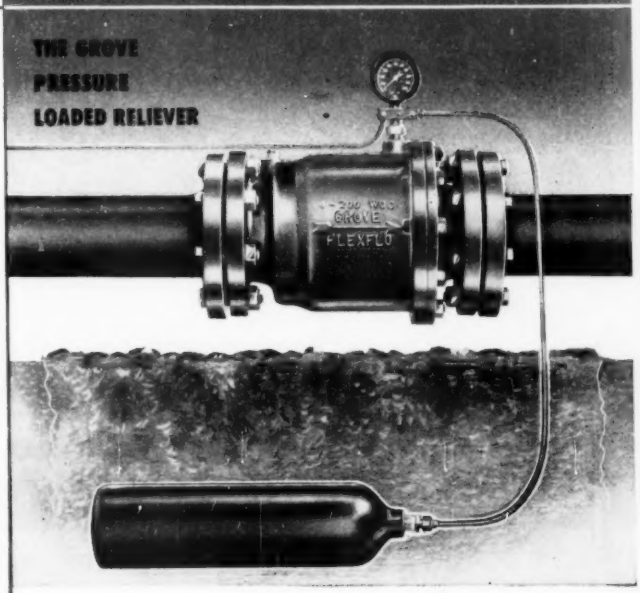
INSTANT RESPONSE
POSITIVE ACTION
BUBBLE-TIGHT SHUT-OFF
LONG SERVICE LIFE

YOU NEED

THE GROVE
PRESSURE
LOADED RELIEVER







The Grove Flexflo Pressure Loaded RELIEVER is appearing all over the oilfields. Oil men are beginning to discover its flexibility —its adaptability as either a Relief Valve or Back Pressure Regulator on constant or intermittent flow. Incorporating all the outstanding features of the Grove Flexflo, the Model 888 gives instant response to the smallest line pressure variation. The rubber-tube is smooth and positive in action, eliminating seepage and leakage . . . offering sure and certain operation when installed in parallel with code-required relief devices.

For ground-insulation against temperature changes, the pressure cylinder can be buried: Where pressure variations due to temperature changes are not important, the cylinder may be attached directly at the Flexflo for ease of installation and maintenance. Self-contained and self-operating, the Grove RELIEVER will give years of satisfactory service, opening and closing thousands of times with no sticking or chattering, no troublesome operation or maintenance problems. Write for full details and application data today.

GROVE
SIMPLICITY ACCURACY SAFETY

GROVE

FLEXFLO
"PUTS PRESSURE TO WORK"

PRESSURE LOADED
RELIEVER

GROVE REGULATOR COMPANY • *65th & Hollis Street, Oakland 8, California*

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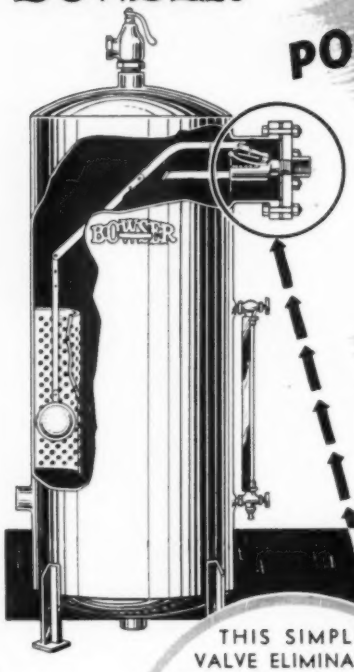
BOWSER
ESTABLISHED 1885

POSITIVE ACTION SEPARATOR

FOR GAS AND OIL



No Packing Glands
No Metal-to-Metal Seats
No Grinding or Reseating
Eliminates Crude Spill-Over into Gas Line

DEPENDABLE OPERATION ON FLOWING WELLS, PUMP PRESSURE OR VACUUM

THIS SIMPLE VALVE ELIMINATES CONVENTIONAL BACK PRESSURE REGULATOR, OIL VALVE AND FLOAT FLANGE

Peel Off Valve

There's

NOTHING TO GET OUT OF ORDER WITH THE BOWSER PEEL-OFF VALVE!

It reduces gas trap maintenance to a negligible item. The operating principle is as simple as peeling a banana!
The control rod is easily adjusted to permit either throttling or snap-action performance.

HOW IT WORKS

Crude oil and gas enter the separator. As the liquid level rises, the float begins to close the gas outlet (PEEL-OFF VALVE) which causes pressure to build up inside the separator.

When the pressure becomes sufficient to open a spring-loaded valve on the crude oil outlet, fluid is forced out until the pressure is equalized. Then the liquid rises again and the cycle is repeated.

The efficiency of this Bowser gas and oil separator has been proved in hundreds of installations!

Write today for your copy of bulletin No. 426 which contains complete operating data, capacities and dimensions.

BOWSER, INC.
1328 Creighton Ave. • Fort Wayne 2, Ind.

Bowser Oil Well Meter with Automatic Sampler

—provides reliable records of oil well production—*both quantity and quality*—AT THE WELL. Usually installed integrally with the Bowser Gas Separator to provide a complete Well-Check unit for permanent or mobile service.

SALES AND SERVICE

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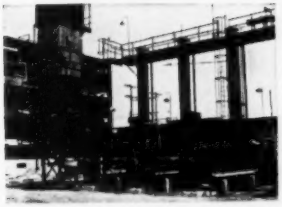
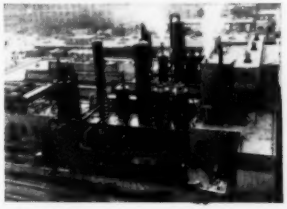
LIQUID CONTROL SPECIALISTS SINCE 1885



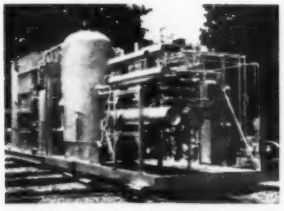
HYDROGEN: Girdler-built *Hygirtol* hydrogen plants have established a new standard of effectiveness and economy.



DRY ICE: This modern, efficient dry-ice plant demonstrates another phase of Girdler's versatile, practical construction experience.

Let's go to work!

HYDROGEN SULPHIDE: In the petroleum industry the hydrogen sulphide removal problem is neatly solved by Girdler-built *Girbotol* purification units.



CARBON DIOXIDE: Portable CO_2 plants, built by Girdler, are an important factor in the world-wide production of America's greatest soft drink.

As long as it remains on paper or in the lab, the most "beautiful" process does nobody any good.

And so Girdler's fine reputation for process development is backed by hundreds of Girdler engineers and construction men who know the practical angles and have demonstrated it by building plants for just about every major industry involving gas, petroleum, or chemical processes. Highly successful in following through from original process designs, Girdler has been equally successful in finishing the job.

Whether remodeling is involved or a complete new plant, get that project started on the right foot. Talk it over with one of Girdler's engineers.

GAS PROCESSES DIVISION

THE *GIRDLER* CORPORATION

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BUSES

OIL FIELDS

FLEXIBLE HOSE LINES with DETACHABLE FITTINGS

Easily assembled in your own shop.

Operating temperatures from —40° to +275° F.

For use with hydraulic fluids, lubricating oils, water, air and many other fluids.

SELF-SEALING COUPLINGS

Allow separation and reconnection of fluid-carrying lines without loss of fluids or inclusion of air. 1 coupling takes the place of 2 hand-operated valves.

Aeroquip for Better Performance, Maintenance and Service

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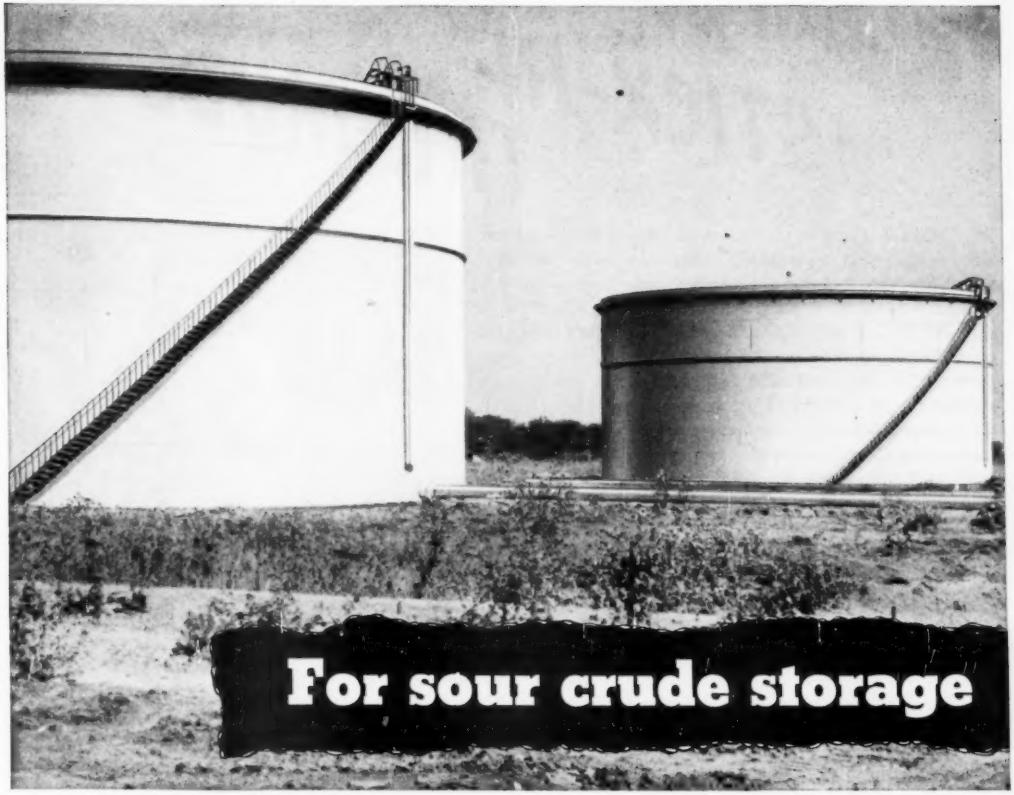
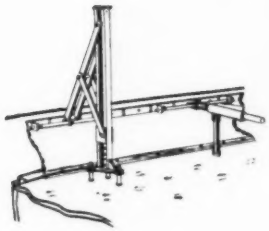
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD



GRAVER FLOATING ROOF TANKS END CORROSION—END FILLING LOSSES



Corrosion and filling losses . . . these are the problems that complicate the storage of sour crude. To meet these problems efficiently and economically, Graver offers an improved Floating Roof with Full Double Deck. Check these advantages:

SEAL maintains full contact with tank shell at all points to prevent the escape of valuable vapors. All filling losses and up to fifty per-cent of standing losses (compared with cone roof tanks) are eliminated.

CONTACT is complete between under side of roof and surface of stored product. There are no pockets where vapors can collect and allow corrosion.

COMPLETE DOUBLE DECK provides a dead air space which adequately insulates the product and prevents boiling.

SHOE wear is reduced to a minimum by an exclusive flexible hangar mechanism which holds the seal "gently" against the tank shell.

The Graver Floating Roof with Full Double Deck is available for tanks of *all* capacities. Write today for details and recommendations on the solution of your sour crude storage problem.

GRAVER

FABRICATED PLATE DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

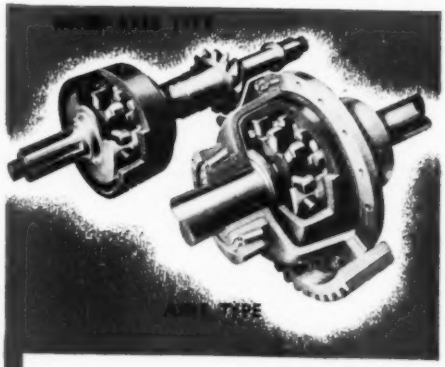
NEW YORK • PHILADELPHIA • CHICAGO • CATASAUQUA, PA. • HOUSTON • SAND SPRINGS, OKLA.

NO PLACE FOR... "STICK-IN-THE-MUDS"

◆ Trucks that stick in the mud are an expensive proposition when you're trying to get the big loads out on stepped-up schedules. When they bog down, profits go right down with them.

Masters of the mire, Mack six-wheelers keep going through slippery mud and sand because they have the benefit of Mack's exclusive Power Divider. This unique device divides torque between the two bogie axles and between the four driving wheels. Torque is delivered proportionately to wheels having the most traction, thus eliminating dissipation of power in useless slippage and wasteful wheel spinning.

If "stick-in-the-muds" are holding you back, it will pay you to investigate the profit possibilities of dependable, hard-working Mack trucks. Write or call your nearest Mack branch or dealer for the complete story on what Macks can do for you.



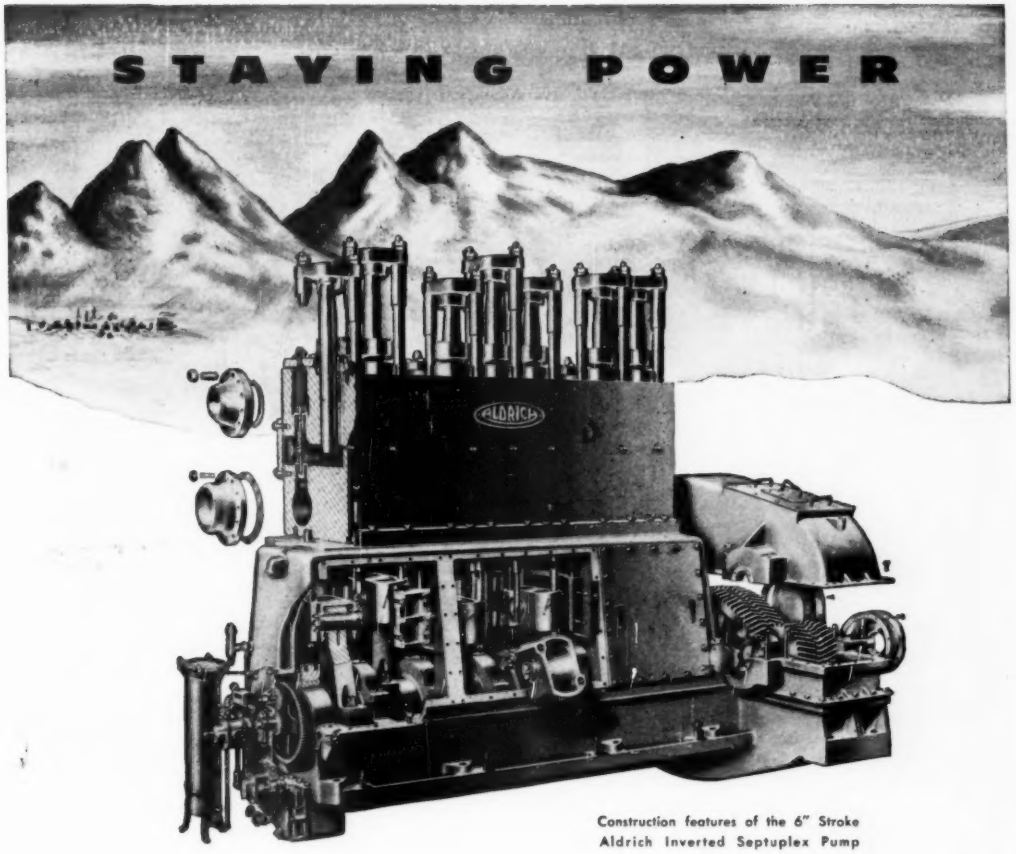
it's a job for MACK TRUCKS

IT'S PART OF THE LANGUAGE

Built Like a **Mack** *Truck*

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Limited.

STAYING POWER



Construction features of the 6" Stroke
Aldrich Inverted Septuplex Pump

Every oil field, pipe line and refinery man knows that an oil industry pump must have *staying power*—the ability to maintain top performance and high efficiency over a long period of time. Interruptions or breakdowns cost. *Staying power* pays. And Aldrich Pumps have that staying power.

Consider a certain 232 mile crude oil pipe line in Wyoming. This line crosses the south hills of Big Horn Mountain at 6,328 feet, drops to 4,320 feet, traverses ridges of over 6,200 feet, spans the Shoshone River Valley, then rises again to the oil field. Two Aldrich Pumps are installed on this line to provide the pressures and capacities necessary to meet these pumping requirements.

Take a look at the Aldrich design and construction that make such rugged service easy. The 6" Stroke Septuplex Pump shown here is but one of several types built specifically for petroleum service. And all Aldrich Pumps are just as well built. For assistance in selection of the Aldrich Pump to fit your need, write now to:

Representatives: Birmingham • Bolivar, N. Y. Boston • Chicago • Cincinnati • Cleveland Denver • Detroit • Duluth • Houston Jacksonville • Los Angeles • New York • Omaha Philadelphia • Pittsburgh • Portland, Ore. Richmond, Va. • St. Louis • San Francisco Seattle • Spokane, Wash. • Syracuse • Tulsa

THE ALDRICH PUMP COMPANY

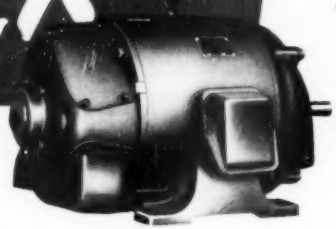
9 GORDON STREET, ALLENTOWN, PENNSYLVANIA

The **FIRST** *Name in Oil Field Pumps*

Century

Repulsion Start
Induction
Brush Lifting
Single Phase

Motors Have the POWER



To Start Pumping Units Under Full Load

Because repulsion start motors have the highest starting torque per ampere of any single phase motor, they are ideal for oil field pumping units, compressors, and other equipment which must start under full load.

Century Type RS, Repulsion start induction, brush lifting single phase motors are widely used wherever single phase power is distributed. They have been satisfying owners for more than 44 years. They have proven their ability to maintain continuous production on oil pumping equipment.

Century Type RS motors are easily adaptable to automatic control by time clock—or manual starting and stopping. Splashproof frames for outdoor installation protect against the hazards of rain, snow, sleet and ice.

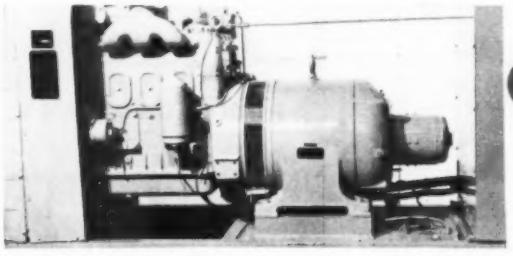
Century builds a complete line of Alternating Current, single phase and polyphase types and Direct Current Motors from 1/6 to 400 H.P.

Specify Century motors for all your electric power requirements. Get complete information from your regular supply store.

Popular types and standard ratings are generally available from factory and branch office stocks.

CENTURY ELECTRIC CO.
1806 Pine St., Saint Louis 3, Missouri
Offices and Stock Points in Principal Cities

Century C MOTORS

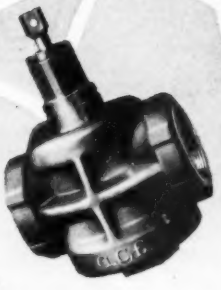


Type ARC Generator

-623

Where public service current is not available, Century Generators will provide adequate, continuous electric power. Depending on the load per motor and the size of generator, from 10 to 30 wells can be operated from one generator. They provide a dependable source of oil field power.

Cylindrical Plug gives 45% more flow area* than ordinary plug valve!



* 200 lb. W.O.G. Valve

Every a.c.f. Round-Port Lubricated Plug Valve has a cross-section area as great or greater than the pipe it serves...resulting in a smooth non-turbulent flow, lowest head loss. Why use anything less efficient.

a.c.f. CYLINDRICAL FULL PIPE AREA LUBRICATED **PLUG VALVES**

Representatives in more than 50 Principal Cities

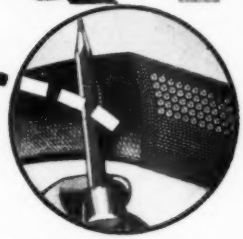
Reference catalogue No. 3-OG—of types and sizes available on request. Write American Car and Foundry Company, Valve Division, 30 Church Street, New York 8, N. Y.

Make this Test with ANY V-Belt

You'll See at Once Why the

CONCAVE SIDE---

(U.S. Patent No. 1813698)



Saves You Money!

Bend any V-Belt and feel the sides change shape. The top of the belt, under tension, *narrows.* The body, under compression, *widens.* The sides of the belt bulge out.

The result, if the belt is built with *straight sides,* is a shape that does not fit the sheave groove—as shown in Figures 1 and 1A, below.

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove

Clearly, the bulging of the sides will produce excessive wear along the *middle* of the sidewall as indicated by arrows.

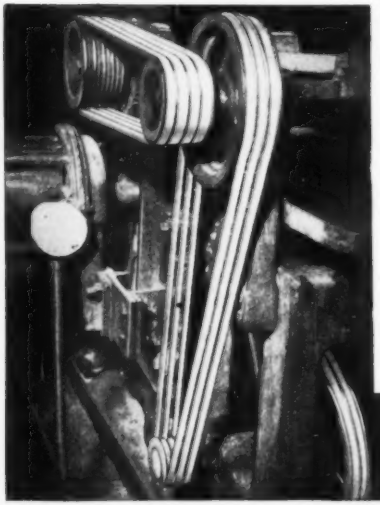
Now, bend a V-belt with the *concave* side—the Gates Vulco Rope.

You get the same shape change but *now* the new shape exactly fits the sheave groove—as shown in Figures 2 and 2A.

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave-Groove.

Results? (1) *Uniform* sidewall wear; *longer life!* (2) Full sidewall grip on the pulley. Carries heavier loads and *sudden load increases* without slippage; saves *belts* and also saves *power!*



The Concave Side is *MORE IMPORTANT* NOW Than Ever Before

Because the *sides* of a V-Belt are what actually *drive* the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley *directly* through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

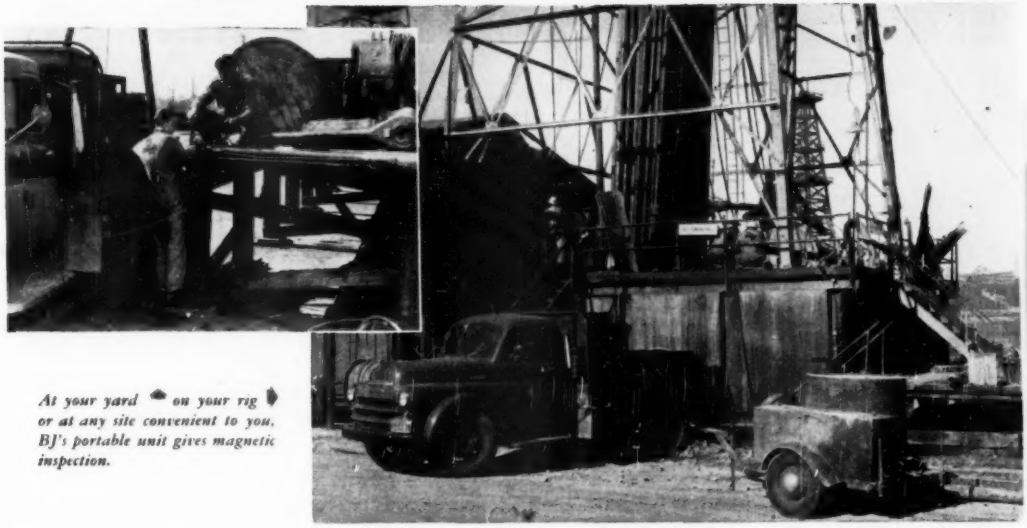
494

Gates

The Mark of SPECIALIZED Research

GATES VULCO ROPE DRIVES
IN ALL INDUSTRIAL CENTERS
Engineering Offices and Jobbing Stocks of the U. S. and 91 Foreign Countries

have your BJ tools MAGNETICALLY inspected



At your yard ◂ on your rig ▸ or at any site convenient to you, BJ's portable unit gives magnetic inspection.

The new BJ Field Unit will Magnaflux, inspect and clean your BJ Tools at no cost to you

WHEN YOUR RIG IS MOVING, or whenever convenient, have your string of BJ Tools Magnafluxed free of charge. This magnetic particle inspection may catch metal fatigue before complete breakdown, and avoid the scrapping of expensive units. Don't lose valuable hole time or equipment by unexpected failures which can be avoided. BJ's Field Crews thoroughly test the critical sections of your BJ Tools, and spot the fatigued parts needing repair or replacement. These crews are experienced inspectors. They have been *specially trained* in the Magnaflux Corporation training course and in our own plants. Their portable equipment is the finest and the most modern available. Simply call your nearest BJ representative . . . you'll get a definite date and time for this exclusive field service in your area. Now available in West Texas and, later, at other mid-continent points.

IF MAJOR REPAIRS ARE NEEDED, get BJ engineered precision rebuilding by sending tools to the nearest BJ factory. By taking advantage of this gratis Inspection Service, heeding recommendations, and shopping regularly you can gain years of service at nominal cost from your engineered BJ Tools—irrespective of age or service. If replacement parts are all that are required, get genuine parts through your BJ supplier.

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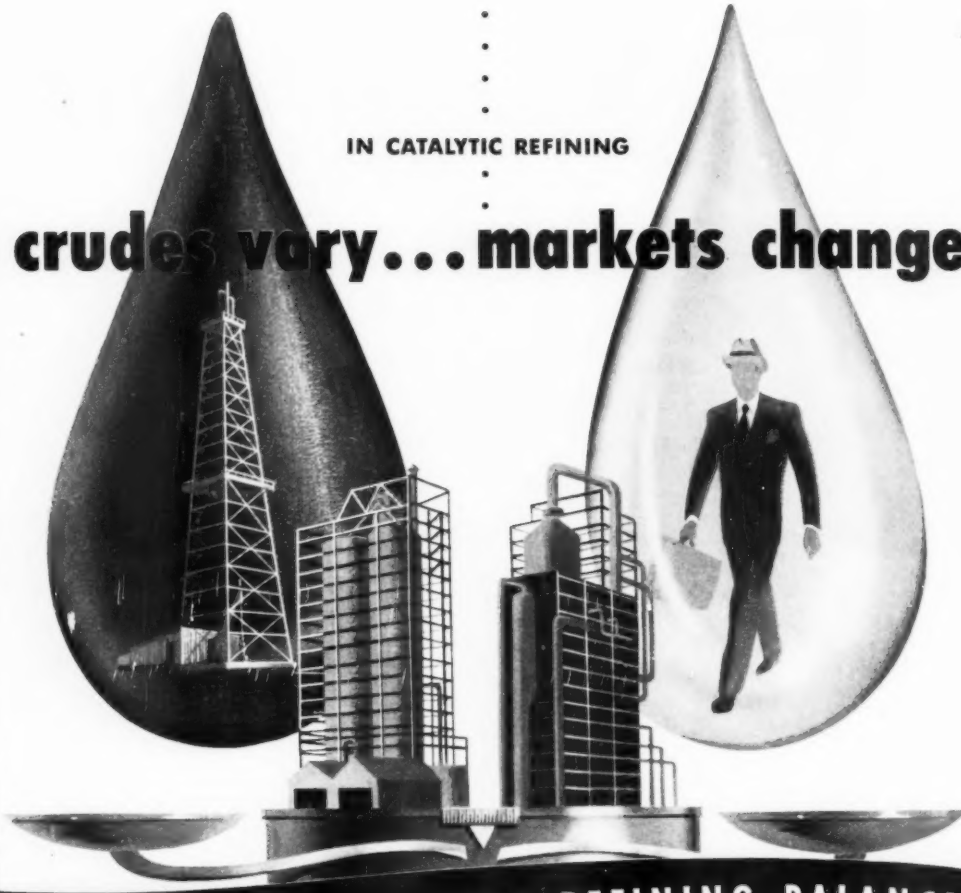
IN CATALYTIC REFINING

crudes vary... markets change



FILTROL* CATALYSTS GIVE REFINING BALANCE

More refiners use Filtrol catalysts each year because Filtrol catalysts have proven over the years to be more flexible–to produce quality with minimum refining costs from a wide selection of charging stocks.

Experienced refiners compare catalysts at their practical optimum, those plant operating levels which integrate with overall refinery balances. Refinery executives, production managers and technical staffs responsible for economical refinery balance –the men actually refining the bulk of America's production–the men who must take varying crudes and produce market demands–are using more Filtrol catalysts than ever before–proof that Filtrol catalysts give greater refining balance.

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General Offices: 634 South Spring Street, Los Angeles, California

Plants: Vernon, California and Jackson, Mississippi

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write for name of agent in your country

PRODUCT OF **Filtrol**

CATALYSTS AND ADSORBENTS

RESEARCH AND DEVELOPMENT

*Reg. U. S. Pat. Off.

ALFCO

DRY CHEMICAL!

OUR *Newest* FIRE EXTINGUISHER FOR FIGHTING CLASS B and C FIRES

Such fires now meet their master—*faster!* The new Alfco Model 30 Dry Chemical Fire Extinguisher snuffs out savagely hot, quick-spreading blazes in gasoline, oils, or greases by the *swift fire-killing action of Alfco Dry Chemical.* This efficient new unit affords dependable fire protection to flammable liquid and electrical risks—indoors or out—*in any season!*

Note the outstanding advantages of this new Alfco Model 30 Dry Chemical Fire Extinguisher!

. . . Longer range and longer duration of discharge at all climatic temperatures! . . . More complete discharge of contents! . . . Operates in any carrying position! . . . Nozzle affords wider coverage of fire area! . . . Gas-tight, all-internal expelling gas connections! . . . Built-in safety disc! . . . Hose couplings swaged for greater strength, smarter appearance! . . . High position avoids compacting of Dry Chemical! . . . Easy to recharge without special tools or parts! . . . Occupies only 7″ x 9″ floor space! . . . Lighter in weight!

Alfco Dry Chemical is nontoxic, noncorrosive, nonfreezing, and a nonconductor of electricity. Approved by both Underwriters' and Factory Mutual Laboratories. Rating: B-1, C-1.

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OUR 2nd Century of Leadership in FIRE PROTECTION

AMERICAN-LAFRANCE-FOAMITE Corporation

ELMIRA · NEW YORK · U.S.A.

ALFCO

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

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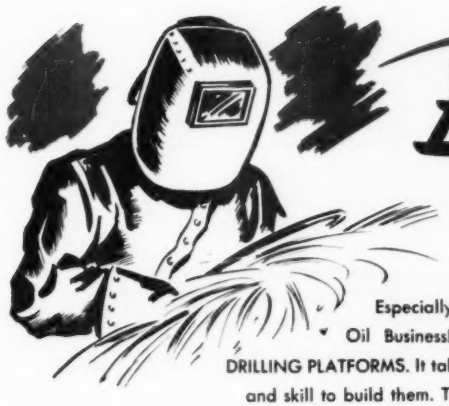

Efficiency Counts

Especially in the marine end of the Oil Business! You take these OFFSHORE DRILLING PLATFORMS. It takes *efficiency* and knowledge and skill to build them. The same with BARGES! They're a special type of craft, built to last. And TUGBOATS, the work-horse of the business, they're not playtoys, especially the steel ones.

Call AVONDALE!

It's better to call on an *efficient* expert like AVONDALE. They know how to build and repair — how to save unnecessary cost! Take those new steel service launches you've been reading about . . . it takes quality workmanship to turn them out as AVONDALE does. That's why — *On Marine Problems* — call AVONDALE!

STEEL

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QUICK REPAIR PLANT — HARVEY, LA.

Guiberson 45-TON TYPE "A"

PACKING PROBLEMS REDUCED!

SWIVEL

with the
FULL-FLOATING WASHPIPE

Your crew will have less down-time with this rugged swivel, because the Guiberson developed full-floating washpipe rotates in two independent packing glands. The unique design of this packing arrangement literally cuts wear on the washpipe in half, because rotation is in either or both packings. Life of packing and washpipe is greatly increased, and when the assembly finally needs replacing it comes out easily and quickly without moving the gooseneck or hose. No special tools are required. Full-sized roller bearings are extra heavy-duty and turn in a circulating oil bath. Extra-large fluid passage is built into the gooseneck, washpipe and spindle. Gooseneck connection: 2 1/2 A.P.I. female line pipe thread. Bottom connection: 3 1/2" 8-thd. left hand A.P.I. internal upset drill pipe.

The Type "A" 45-Ton Swivel completes a unitized drilling string of Guiberson Tools for drilling, work-overs and clean-out work, using reverse circulation. The entire string of Block & Hook, Swivel, Kelly and Drilling Head is ideally suited for short derricks and portable rigs.

***See** your Guiberson representative for complete information on the Type "A" 45-Ton Swivel and the unitized drilling.*

Guiberson U. S. A.

MAKE THEM SORRY THEY DIDN'T BUY GUIBERSON

REG. U. S. PAT. OFF.
ESTABLISHED 1919

The Guiberson Corporation

DALLAS, TEXAS

California Operations: The W. K. Guiberson Co., 717 East Gage Avenue, Los Angeles 1
Export Office: 30 Rockefeller Plaza, New York 20

Branch Offices in Texas: Gladewater, Kilgore, Houston, Alice, Odessa and Wichita Falls, Texas; Lafayette, Louisiana; Wichita, Kansas and Newark, Ohio

The Guiberson Corp.

PERSONAL SUPERVISION
ON TANK AND PIPING REQUIREMENTS . . .

adds the finishing touch to every

ELLERBEE JOB!

This is the Southwestern Oil & Refining Company's new refining plant at Corpus Christi, Texas, where Ellerbee Brothers have recently completed 22 welded steel tanks, ranging in size from 15' x 16' to 100' x 48'.

During the entire construction period, this job, which is typical of dozens of other Ellerbee Brothers jobs, was given personal supervision by key personnel from the Ellerbee organization.

That's a regular part of Ellerbee Brothers construction service that adds the finishing touch to every Ellerbee job. Our organization is *large enough* and *experienced enough* to undertake any size job . . . yet *small enough* to give your work personal supervision. We will appreciate an inquiry on your tank and piping problems.

● tank erection ● tank repairing ● tank dismantling ● tank moving ● industrial piping ● tank fabrication ● piping fabrication ● complete construction facilities.

ELLERBEE BROTHERS

P. O. BOX 857 PORT ARTHUR, TEXAS

Pick your PROTECTION to PERFECTION!

AO 700
RUBBER FRAME GOGGLE
PROTECTS AGAINST CHEMICAL AND DUST HAZARDS . . .

AO 705
SUPER VENT GOGGLE
PROTECTS AGAINST FOGGING AND STEAMING ALSO

These two NEW Goggles are identical except for the special nosepiece and inhalation and exhalation valves on the 705 which operate to prevent fogging and steaming in hot, humid working conditions. Each goggle is designed for the greatest possible protection and comfort — each features a large shatter-resistant single acetate lens which can be *easily replaced*, and WIDE ANGLE VISION.

The all-rubber frame molded to conform to face contours provides an airtight, dust-tight fit. While the 705 is recommended for severely hot and humid operations, the 700 provides ample ventilation in normal atmospheres. A filter element under the perforations at top and sides of the goggle blocks acid and dust from the eye area. Headband is comfortable and adjustable.

The 705 Super Vent Goggle operates by air sweeping through a chamber when wearer inhales, thus removing moisture on the inner lens surface before fogging can begin. When exhaling, inlet valve closes and moist air escapes through exhalation valve. Your AO Safety Representative can supply you with the right goggle for your needs.

American Optical *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Mogul TORCAIR RIG

WITH SENSATIONAL NEW *Air Control*

COMPARE PRICES BEFORE YOU BUY!

- **FOR DRILLING WELLS TO 4000 FT. WITH 4½" DRILL PIPE.**
- **FOR SERVICING WELLS TO 8000 FT. WITH 2½" TUBING.**
- **FOR SERVICING WELLS TO 16000 FT. WITH 2½" TUBING (using 15" Double Rotor Hydromatic Brake).**

Complete rig on one skid! Full panel air control! Incomparable in its rated capacity class for portability! WILSON MOGUL TORCAIR RIGS incorporate the advanced AIR CONTROL and adjusted TORQUE APPLICATIONS of the larger WILSON RIGS . . . it is particularly designed for deep well servicing, and like all WILSON machines, it does the job like a thoroughbred. Compactly built with large air compressor and air tank, it measures less than 8 feet overall width, with catheads removed. WILSON Air-Tube Clutches in the drum; automatic feed brake enables the driller to set brake and leave it in one position. Numerous other features worth looking into! Write for Bulletin 174 — it's just off the press!

Wilson

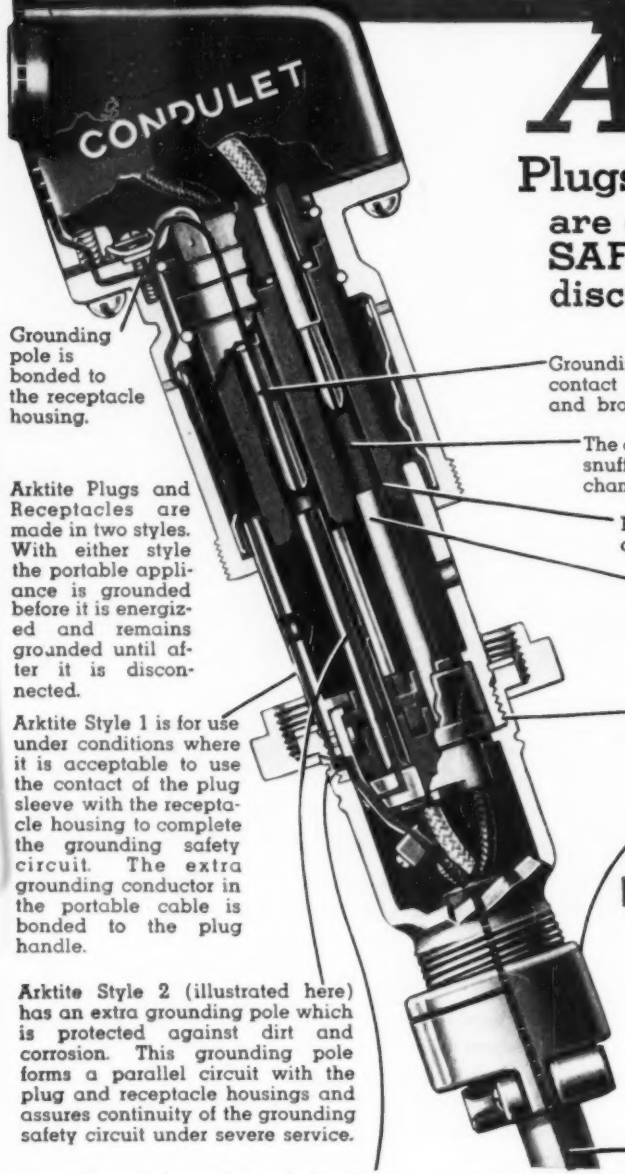
MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

CROUSE-HINDS

Arktite

Plugs and Receptacles are circuit breaking and SAFE without additional disconnect equipment.



Grounding pole is bonded to the receptacle housing.

Arktite Plugs and Receptacles are made in two styles. With either style the portable appliance is grounded before it is energized and remains grounded until after it is disconnected.

Arktite Style 1 is for use under conditions where it is acceptable to use the contact of the plug sleeve with the receptacle housing to complete the grounding safety circuit. The extra grounding conductor in the portable cable is bonded to the plug handle.

Arktite Style 2 (illustrated here) has an extra grounding pole which is protected against dirt and corrosion. This grounding pole forms a parallel circuit with the plug and receptacle housings and assures continuity of the grounding safety circuit under severe service.

Grounding conductor is bonded to the plug handle.

Arktite Style 2. Sectional View

Grounding pole is longer than the others so contact in the grounding circuit is made first and broken last.

The arc formed by pulling the plug is instantly snuffed in the confined insulated arcing chamber.

Each plug contact fits closely the opening of its individual arcing chamber.

The arc is broken while the plug contact is still a considerable distance inside of the arcing chamber. There is no danger of the arc traveling over to the other side of the circuit or to the housing.

Two-piece plug is easy to take apart and reassemble.

Direct-pressure clamp insures postive grip on the conductor cable.

The green line indicates the grounding safety circuit.

CROUSE-HINDS offers the only complete line of circuit breaking plugs and receptacles—20 Amp. to 400 Amp., 250 volt D.C., 600 volt A.C.

Complete listings are in the Condulet Catalog.

A Nationwide Distribution Through Electrical Wholesalers

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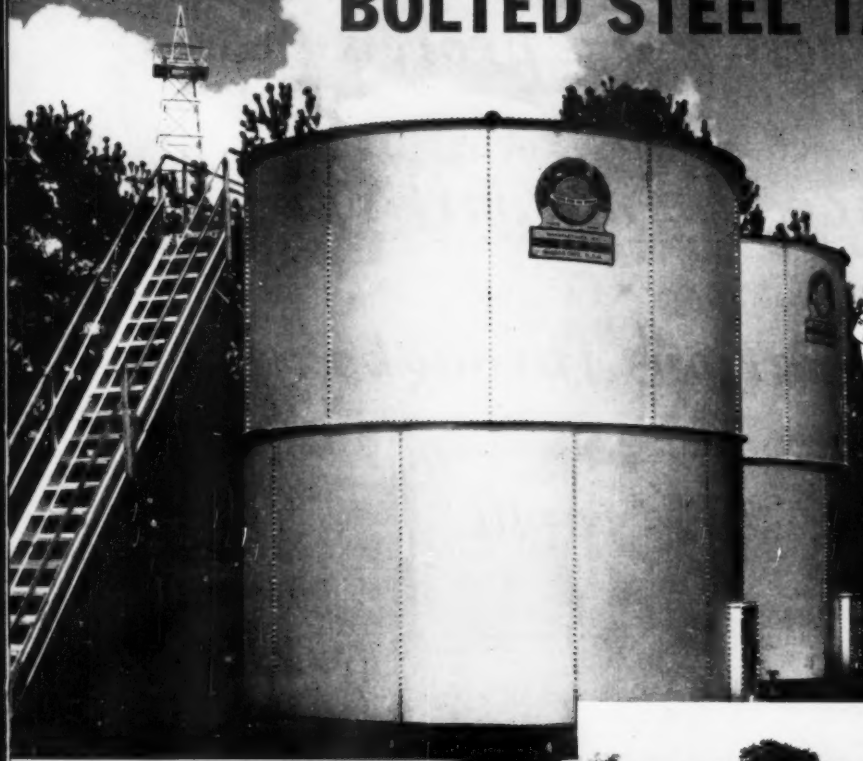
CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

COLUMBIAN
BOLTED STEEL TANKS



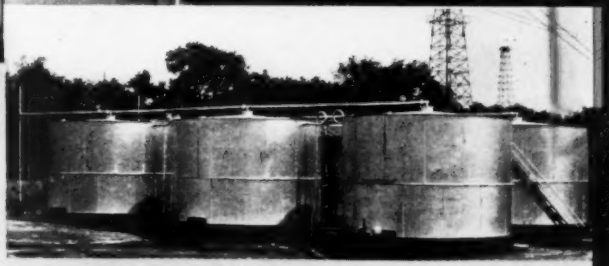
Columbian Bolted Steel Tanks are available now for oil producers.

Columbian COP-NIC Tanks, especially for sour crude, will be available when conditions permit.

Extra Value in Every Capacity

Whether the requirement is for single small units for special storage or a battery of large capacity tanks, COLUMBIAN BOLTED STEEL TANKS continue to rate first choice with oil producers all over the world!

That's because these famous tanks have been tested and proved for more than half a century —because they never fail to deliver extra value in easy, time-saving erection . . . long-life service . . . dependable storage at money-saving cost.



Columbian All-Metal Warehouse Type Buildings are saving money month after month for oil producers who use them for warehouses, engine houses, garages, equipment and storage houses. That's because they are rigid, strong, fire-safe, and require minimum upkeep. Write for complete information.

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When you call Schlumberger, you get a log proven by more than a million operations throughout the world.

● Schlumberger's experience in all types of formations . . . in all types of drilling fluids . . . under all well conditions . . . in every part of the world is your added assurance that when you call Schlumberger, you get the best.

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WELL SURVEYING CORP.
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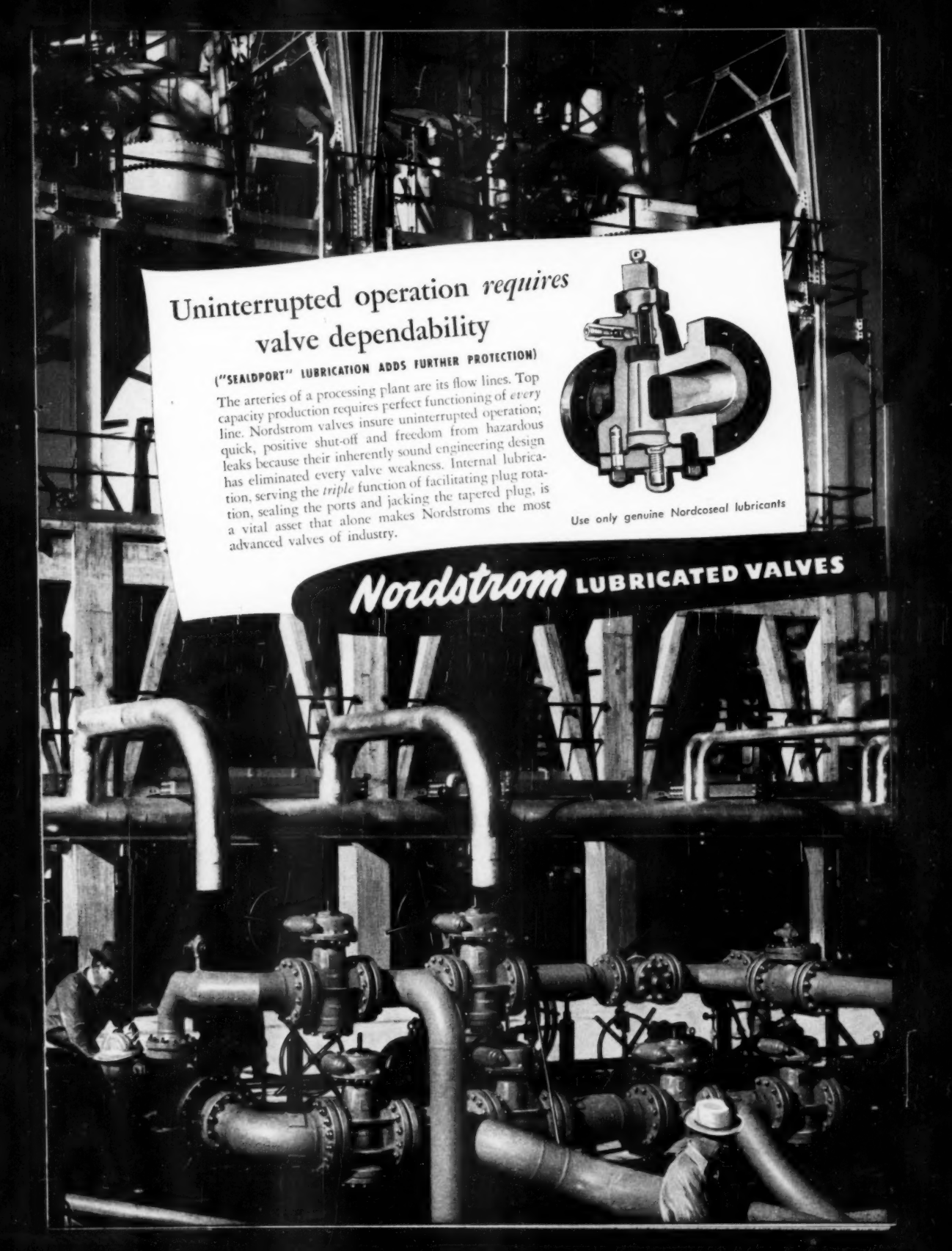
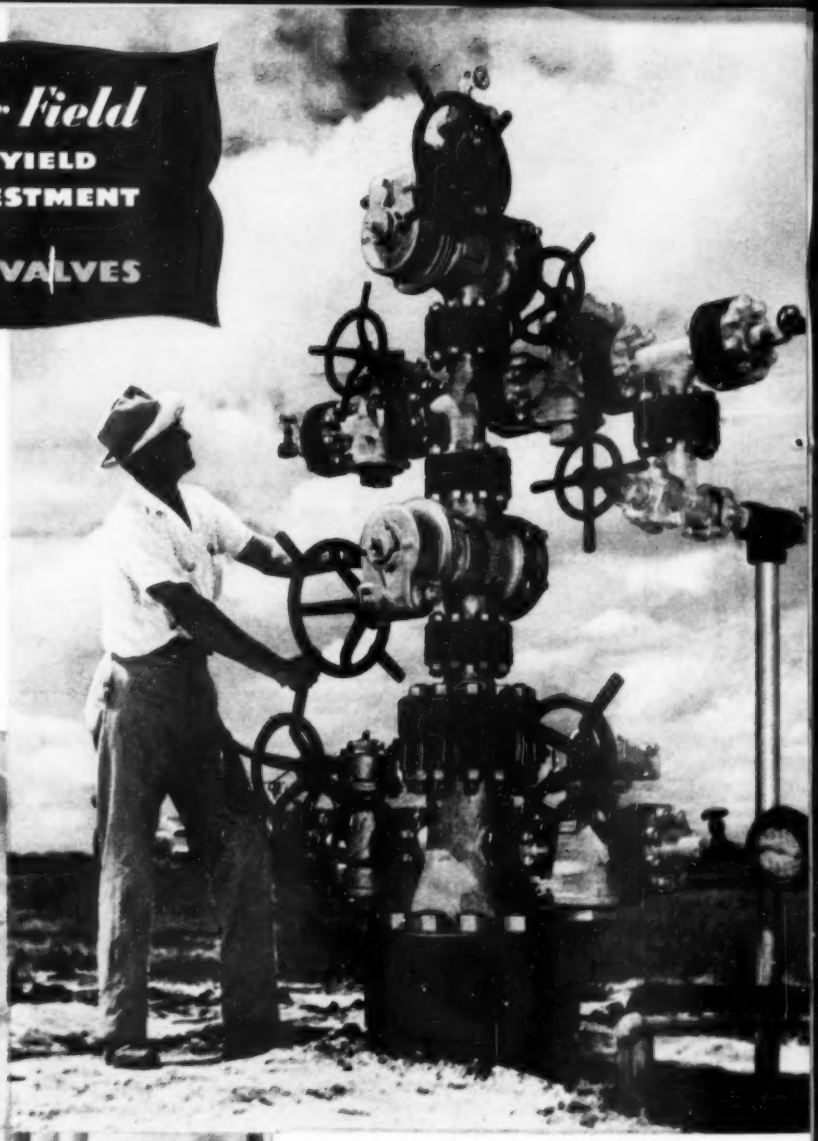

Uninterrupted operation *requires* valve dependability
("SEALDPORT" LUBRICATION ADDS FURTHER PROTECTION)
The arteries of a processing plant are its flow lines. Top capacity production requires perfect functioning of *every* line. Nordstrom valves insure uninterrupted operation; quick, positive shut-off and freedom from hazardous leaks because their inherently sound engineering design has eliminated every valve weakness. Internal lubrication, serving the *triple* function of facilitating plug rotation, sealing the ports and jacking the tapered plug, is a vital asset that alone makes Nordstroms the most advanced valves of industry.
Use only genuine Nordcoseal lubricants
Nordstrom LUBRICATED VALVES

In Plant or Field

A GREATER YIELD ON VALVE INVESTMENT WITH NORDSTROM VALVES

Valves are a major investment. Their true cost must be based on performance and lifetime endurance. Cost-minded engineers are specifying Nordstroms because these valves yield more service per dollar invested; there is an appreciable saving in man-hours; and greatest convenience in operation.



Nordstrom simplicity provides a valve with few parts. All standard specifications are met. A complete range of sizes, pressures and types permits selection of practically custom-made valves for each specific application. Nordstrom engineering service at plant and in the field is of highest caliber, offering experienced counsel in valve selection.

KEEP UPKEEP DOWN

Use only genuine Nordcoseal lubricants

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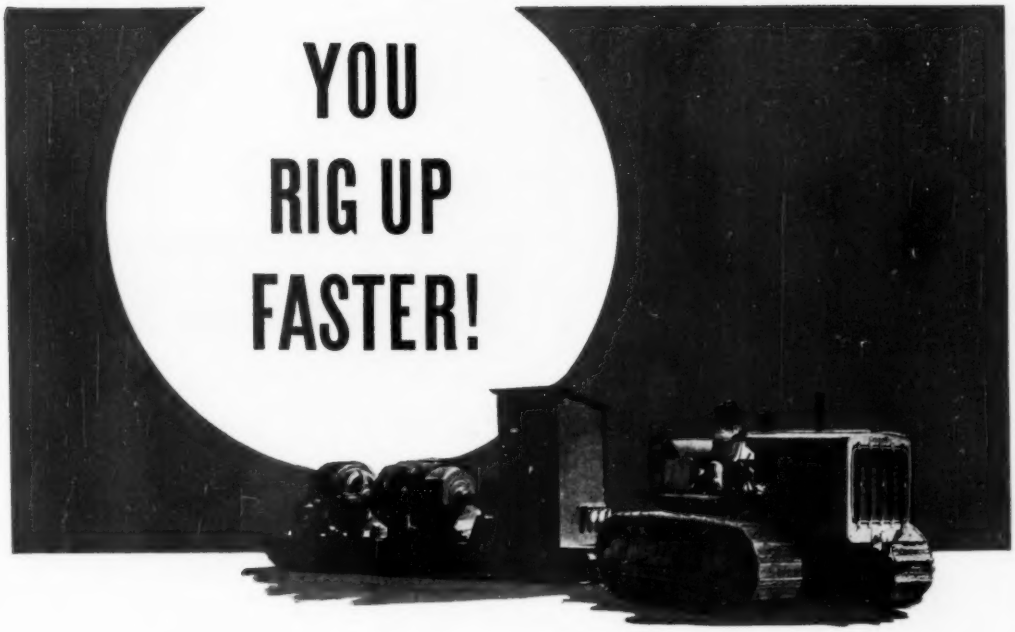
400 N. Lexington Ave., Pittsburgh 8, Pa.

Sales Offices in principal cities. *Export:* Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

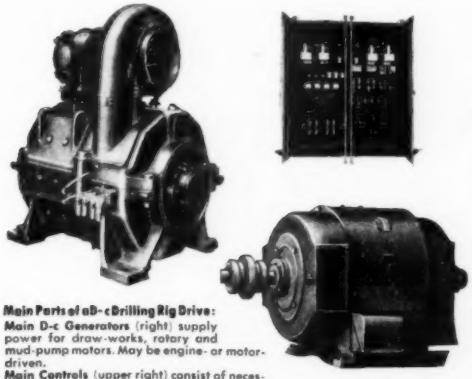
YOU RIG UP FASTER!



...you complete a well sooner with a G-E Electrified Rig!

Rigging up is faster and easier with a General Electric electrified rig, whether you buy power or generate your own. Your rig is lighter and more compact, which makes it more easily portable. And with skid-mounting, the electric equipment can be towed by tractor from one site to another—quickly, economically. Excavation work and time is reduced because—with no mechanical connection required between mud-pump and draw-works drives—you can "spot" your mud sumps and pumps to suit the terrain to best advantage, and most economically.

The electrical hook-up is simple. You plug in the control cables. You bolt on your power connections. In double-quick time, you're ready to start spudding-in . . . and on your way to more on-bottom time for your bit, lower cost per foot of hole drilled! Mail the coupon today for more data on the overall economy and control efficiency of electric drilling. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



Main Parts of aD-c Drilling Rig Drive:
Main D-c Generators (right) supply power for draw-works, rotary and mud-pump motors. May be engine- or motor-driven.
Main Controls (upper right) consist of necessary control and transfer switches, relays, and other devices.
D-c Motors (above) are powered by generators, and drive draw-works, rotary table, etc. through speed-reducers.

More Power to America

General Electric Co., Section E654-78,
Apparatus Dept., Schenectady 5, N. Y.

Please send me the following bulletins:

☐ GEA-4456 (Electric Equipment for D-c Engine-Driven Rigs)
☐ GES-3485 (More Oil at Less Cost Electrically)

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Company _____

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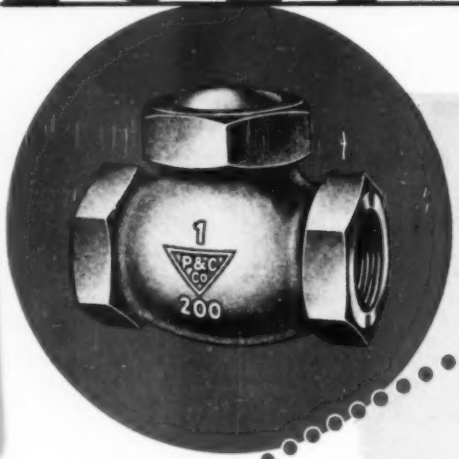
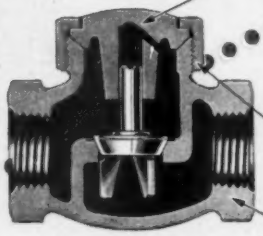
GENERAL ELECTRIC

R·P&C

BRONZE LIFT CHECK VALVES

designed and built to take ***PUNISHMENT***





1 CAP—forms an efficient beveled joint with the body. The integral disc guide has long contact with the disc stem for perfect alignment and resulting free movement and positive seating. It also cushions disc movement.

2 UNION NUT—heavy and rugged. Can be removed and replaced without danger of distorting the body or weakening threads.

3 BODY—has heavy section at cap joint and end hex with long contact end threads. Seat is integral with body.

THESE BRONZE LIFT CHECKS—rated 200 pounds and 300 pounds—are especially suited to prevent back-flow on high velocity line or where flow is pulsating. Shut-off is quick, positive and tight. For use in horizontal lines only. • (On low or moderate velocity lines, R-P&C swing checks are recommended.) • Get in touch with the nearest R-P&C District Office or R-P&C Distributor for information about Check Valves.

ACCO

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R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

READING-PRATT & CADY VALVES

GREEN

is more than an identifying color

In practically every field, Jones "green" sucker rods are a familiar sight. For many years this distinctive color has signified the best in quality rods.

In addition, it also offers an important advantage. For this special paint is carefully formulated to provide an extra protective coating. It is applied only after rods are surfaced and cleaned thoroughly. Then, in a huge specially designed furnace, it is *baked in* at controlled temperatures.

As a result, rods better resist atmospheric conditions. It is this attention to details that has enabled Jones to maintain leadership for over half a century.

For the complete story of Jones products, ask for your copy of our new illustrated catalog.

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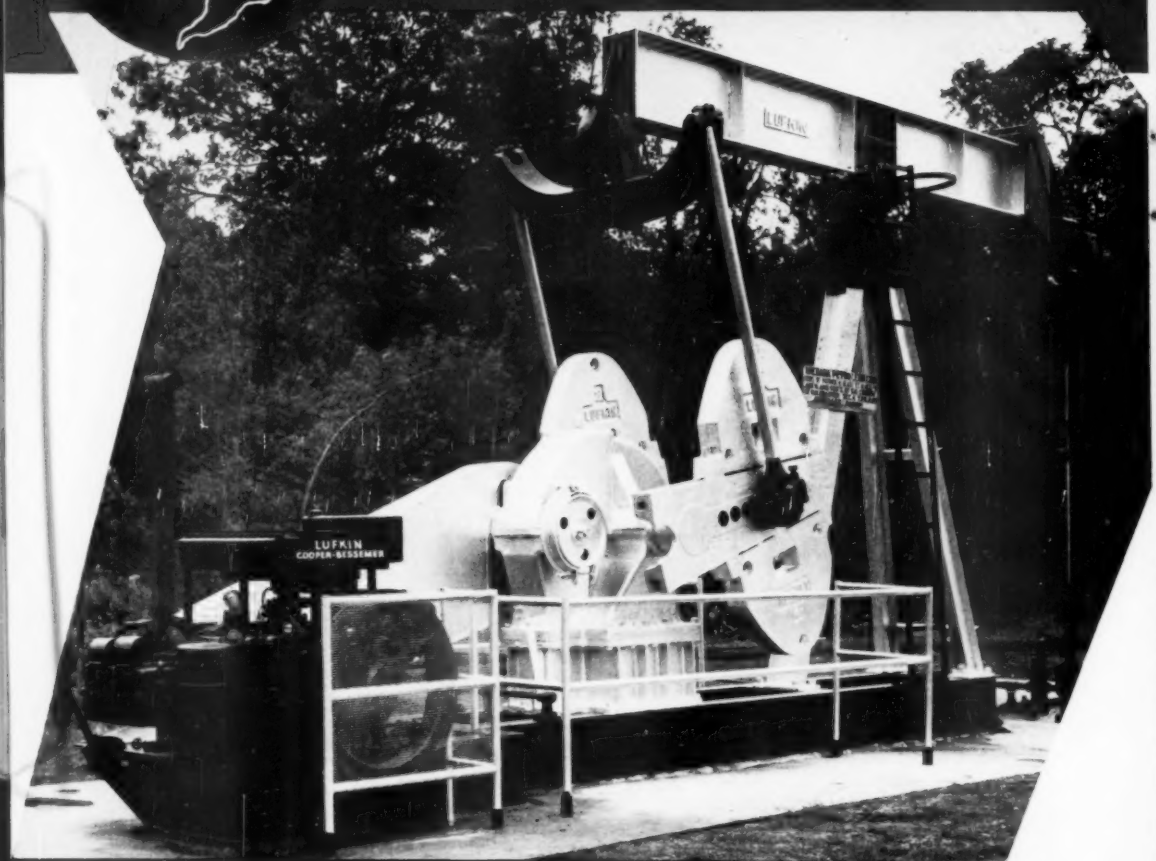
LUFKIN



Conventional installation of Lufkin Unit with Lufkin Cooper-Bessemer horizontal gas engine drive—a Lufkin completely engineered—single responsibility installation.

LUFKIN
PUMPING UNITS

LUFKIN-COOPER-BESSEMER
ENGINES

LUFKIN OIL FIELD AND INDUSTRIAL
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INDUSTRIAL SPEED REDUCERS
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Manufacturers of Lufkin Pumping Equipment—Lufkin Cooper-Bessemer Gas Engines—oil field and industrial truck-trailers of all types—industrial speed reducers and increasers, and commercial gray iron castings.

NO FIELD TOO DEEP!
NO FIELD TOO SHALLOW!

THERE IS A LUFKIN PUMPING UNIT FOR EVERY WELL DEPTH AND EVERY FIELD CONDITION

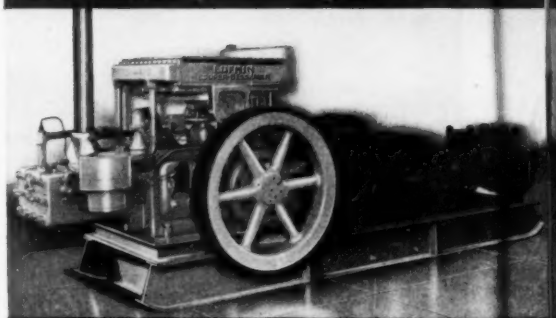
WORLD-WIDE recognition of the rugged dependability and high efficiency of Lufkin Pumping Units places Lufkin equipment first in every oil field of the world!

Lufkin Pumping Units have an especially high appeal for the foreign operator for the reason that few, if any, repairs and adjustments are needed after the unit passes Lufkin's rigid inspection system. Rugged, trouble-free, low-maintenance cost, Lufkin units mean lowest operating expense and highest productive service.

Lufkin pioneered and developed the application of reduction gears for oil well pumping service. A reasonable estimate is that there is more Lufkin pumping equipment in operation today than all others combined.

Lufkin equipment for the oil fields of the world is manufactured in Lufkin, Texas. Branches in principal oil fields.

Lufkin Cooper-Bessemer Horizontal Gas Engine—40-60 H.P. two cylinder two cycle 400-600 R.P.M.



Lufkin Cooper-Bessemer Engine and Pump assembly

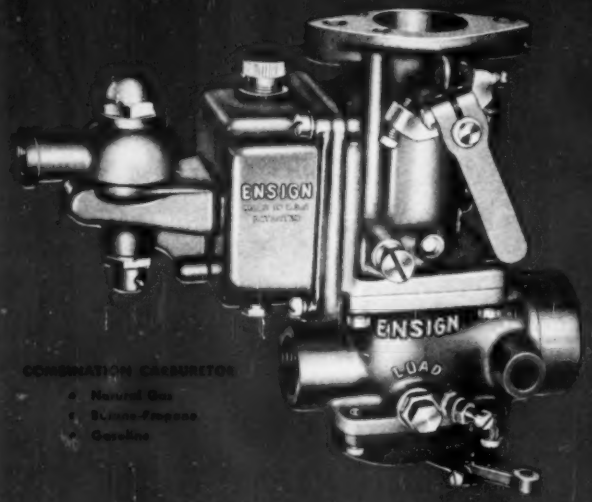
Lufkin Cooper-Bessemer G. S. D. H. Engine Driven generator installations.

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY
INDUSTRIAL, MILL AND AUTOMOTIVE SUPPLIES

MACHINE CO. Lufkin, Texas, U.S.A.

Branch sales and service locations: Dallas, Texas, Los Angeles, New York, Shreveport, Oklahoma City, Houston, Odessa, Kilgore, Wichita Falls, Cooper, Great Bend.

Ensign



Standard of the Industry

OPERATORS THE WORLD OVER KNOW ENSIGN

Whether you are an operator in the Persian Gulf, South America or in the States, chances are about 100 to 1 that each man on the maintenance crew is long familiar with Ensign Gas Carburetion—its simplicity of operation and excellent performance.

Continued dependable performance of any piece of equipment from gas engines to drilling rigs depends largely upon knowledge of its operating personnel. Operators the world over have used Ensign for years. Little wonder then, that Ensign has become almost an integral part in the design of America's leading gas engines.

Your engines will start easier, run better and longer with less maintenance when carbureted by ENSIGN—Standard of the Industry.

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DEALERS AND DISTRIBUTORS IN ALL PRINCIPAL OIL FIELDS

Staying out of trouble isn't just being lucky . . .

here's how I sink those deep producers

"YOU'RE LUCKY, they say, when my boys bring in a deep one without the expected run of trouble.

"But, it isn't a matter of luck. It's simply that I insist on doing the whole job with NATIONAL Seamless.

"I know from experience that NATIONAL's as strong, tough and dependable as any drill pipe, casing, and tubing money can buy. But don't take just my word for it. Look at the recent results of some of the other deep drillers. For example:

"Down in Grady County, Oklahoma, Stanolind's No. 1 Brisco well was brought in flowing from 14,190 ft. with NATIONAL Seamless Casing and Tubing. And, out in Natrona County, Wyoming, Pure Oil Company's West Poison Spider Wildcat established a record as the world's deepest producer with NATIONAL Seamless Drill Pipe, Casing, and Tubing.

"Yes, out here in the oil country, we believe in being forearmed. When you're forearmed with NATIONAL, you've got the best defense you can get against deep hole trouble."

WHAT MAKES NATIONAL SEAMLESS THE MOST WIDELY SPECIFIED OF ALL OIL COUNTRY GOODS

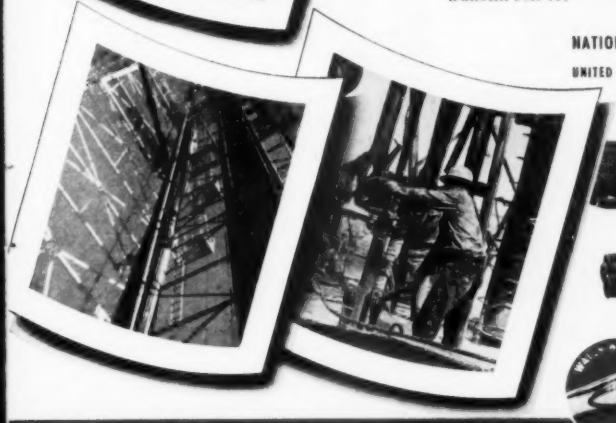
Pierced from a solid billet of steel, NATIONAL Seamless drill pipe, casing, and tubing have no welds . . . no line of potential weakness. They are absolutely seamless from end to end.

Improved both in steel composition and physical properties, NATIONAL Seamless Oil Country Goods meet better the more exacting requirements of the deeper wells. Special upset joints and improved threading practice keep the mechanical features on a quality plane with the metallurgical properties.

For the information on NATIONAL Seamless Drill Pipe, Casing, and Tubing, write National Tube Company, Frick Building, Pittsburgh, Pa. Ask for Bulletin No. 15.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

UNITED STATES STEEL EXPORT COMPANY NEW YORK



USS

NATIONAL SEAMLESS

drill pipe . . . casing . . . tubing

UNITED STATES STEEL

Truco DIAMOND CORE HEAD

THE Jewel OF THE OIL FIELD!

All features so necessary to insure full core recovery are incorporated in D & S core barrels.

Core barrels, core heads, reamers and washover or rotary shoes to suit every hole or casing program.

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WHEEL TRUEING TOOL CO.

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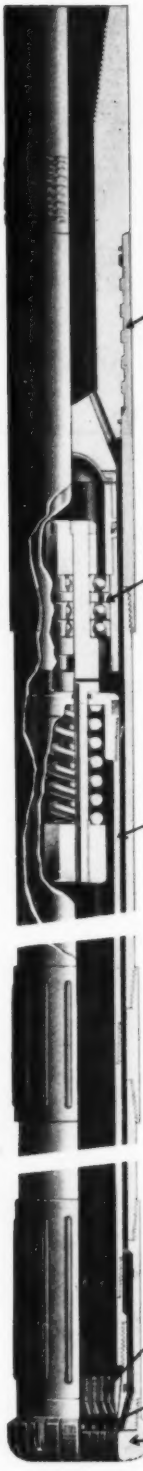

Safety Joint (optional). Should core barrel become stuck, removes inner barrel and core.

Fully enclosed grease packed bearings with diaphragm to equalize hydrostatic pressure differentials, insuring long bearing life and non-rotating inner tubes.

Flush joint alloy steel inner tubes with uniform smooth bore minimizing core friction.

Heavy wall alloy steel tubing used throughout. Sectional with a minimum of joints in lengths up to 90 feet.

Core catcher enclosed inside inner tube eliminates core scrambling and subsequent core blocking.

Minimum of core exposure to circulating fluid.

Truco diamond core head.

for dependable *2-Way* radio communications it's . . .

RAYTHEON RADIOPHONE

Now It's Here!

VM 30-1—30 Watt Mobile Station, 25-50 Megacycle

25-50 and 152-162 Megacycle Radio equipment that's Engineered for dependability and increased efficiency!

VS 50-1
50 Watt Fixed Station
25-50 Megacycle

UM 15-1—152-162 Megacycle (not illustrated)

COMPARE RAYTHEON'S ADVANTAGES!

NOISE-FREE RECEPTION
COMPACT • OUT OF SIGHT
SIMPLIFIED INSTALLATION

COMPARE RAYTHEON'S PERFORMANCE!

LOW BATTERY DRAIN
LOW MAINTENANCE • LONG LIFE

COMPARE RAYTHEON'S PRICE!

LOWEST PRICE IN THE INDUSTRY!
WRITE FOR QUOTATIONS AND SPECIFICATIONS

Our sales engineers will assist you in filing your FCC construction permit at no cost or obligation to you!

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A Subsidiary of Raytheon Manufacturing Company
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Belmont Radio Corporation
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I'd like to have full information and literature on the new 2-way Raytheon Radiophone.

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DEPENDABLE RUGGEDNESS
BOSTON WOVEN HOSE & RUBBER CO.
CONCORD
STEAM #10
BOSTON, MASS.
BWH
1. Tough, long-wearing, abrasion-resistant cover.
2. Asbestos braid insures maximum cover adhesion, and includes NEW type static conducting wire.
3. High-tensile steel wire for strength, for safety.
4. Heat & oil resistant tube.

BWH WIRE BRAID STEAM HOSE CAN REALLY "TAKE IT"

HERE'S PROOF!

To prove conclusively that our new Concord #10 Steam Hose is the last word in sturdiness, we deliberately ran a 30-ton truck over it. What happened? Nothing, except that the hose kept right on with its efficient, trouble-free performance!

Naturally, we don't recommend such treatment. But it's pretty convincing evidence that this hose can stand up under all operating hardships. Tests show it doesn't get stiff and brittle, handles easily, resists scuffing when banged against machinery and rough surfaces. Here's why this hose is outstanding:

1. Has same dependably strong, heat and oil resistant tube that has won fame for extra service in BULL DOG Steam Hose.
2. Braids of high-tensile steel wire make it heat and pressure resistant.
3. Asbestos braid assures perfect cover adhesion, includes NEW static-conducting wire.
4. Tough cover is specially designed to resist abrasion, high temperatures.

Specify the NEW Concord #10 when you want hose that withstands 200 lbs. working pressure with SAFETY, cuts maintenance costs.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult The Happy Company, Tulsa, Oklahoma.

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The HAPPY COMPANY
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THIS..

Speed Increaser "Picture" Has Run Continuously For 17 Years

This is not an unusual service record for Farrel speed increasers in pipe line pumping service. In fact, *ALL* of the units installed in 1932 are still in operation, performing as well as on the day they went to work.

Farrel type SI units were the first speed increasers to be developed in a standard series, and the advantages of their design and construction have been proven by their satisfactory performance in hundreds of installations.

The Farrel SI line, today, consists of 49 standard sizes with speed ratios ranging from 1:1 to 12:1. For higher ratios, units using two sets of gears are supplied with ratio range from 12:1 to 40:1.

Farrel-Birmingham Co. Inc., 344 Vulcan St., Buffalo 7.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Los Angeles

OIL FIELD REPRESENTATIVES
Hercules-Lupfer Engines Sales Co.,
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FB-304

Send for bulletin which gives complete details of Farrel SI Units, including specifications, dimensions, horsepower rating tables and maximum permissible speeds. Just fill out the coupon and drop it in the mail.

Farrel-Birmingham

FARREL-BIRMINGHAM CO., INC.
344 VULCAN ST., BUFFALO 7, N. Y.

Please send me, without cost or obligation, a copy of your bulletin on speed increasers, No. 448.

Name_____ Title_____

Company_____

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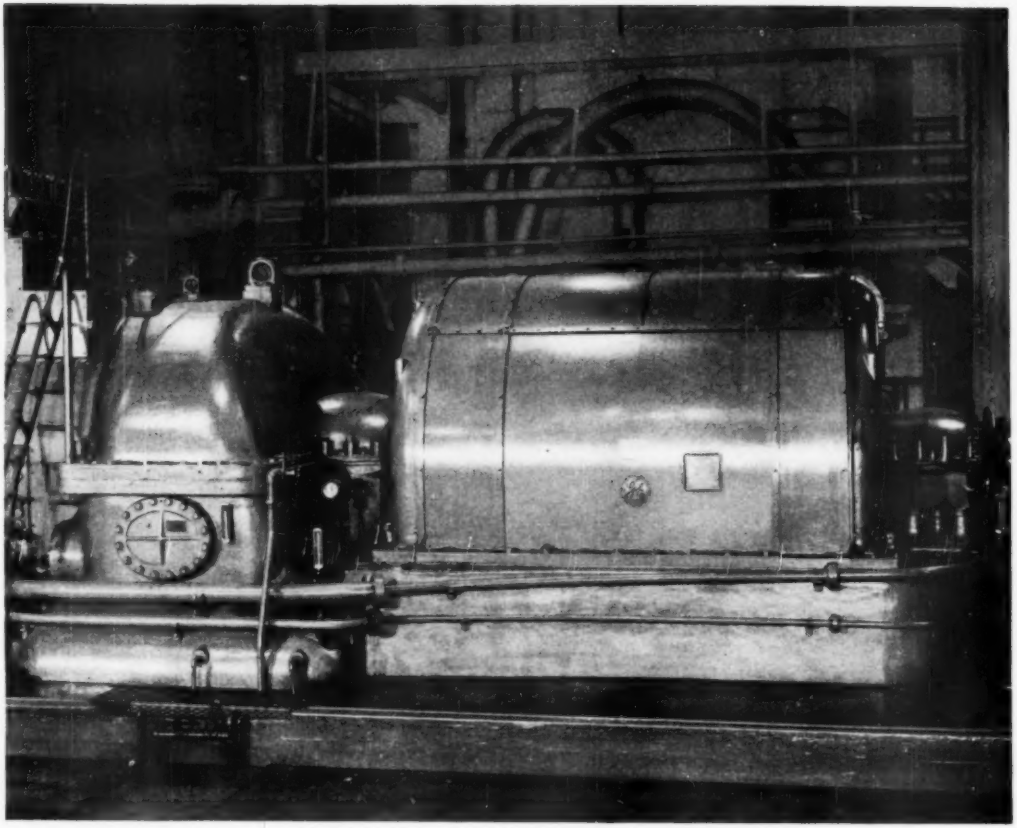
In the life-lines of this power plant...



...FIRE will meet with SUDDEN DEATH!

Fire will never get a chance to knock the generators out of commission in *this* power plant!

Two generators—rated at 12,500 and 7,500 KW—form the heart of the power supply equipment—and *both* are protected by a *single* bank of *Kidde* cylinders of carbon dioxide (CO_2). In case of fire in either generator, automatic directional valves send the CO_2 racing to the unit threatened.

First, a heavy discharge of CO_2 smothers any active flame in a matter of seconds—before damage to the insulation can spread. Then . . . a slower, continuing discharge maintains a high CO_2 concentration . . . *prevents a reflash.* Of course, the CO_2 does not corrode metal or harm insulation.

That's just one of the thousands of *Kidde** installations that are safeguarding equipment and materials all over the world. *Whatever* your fire protection problem, a Kidde representative will help you!

When you think of CO_2, call Kidde!

*Also known as "LUX"

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

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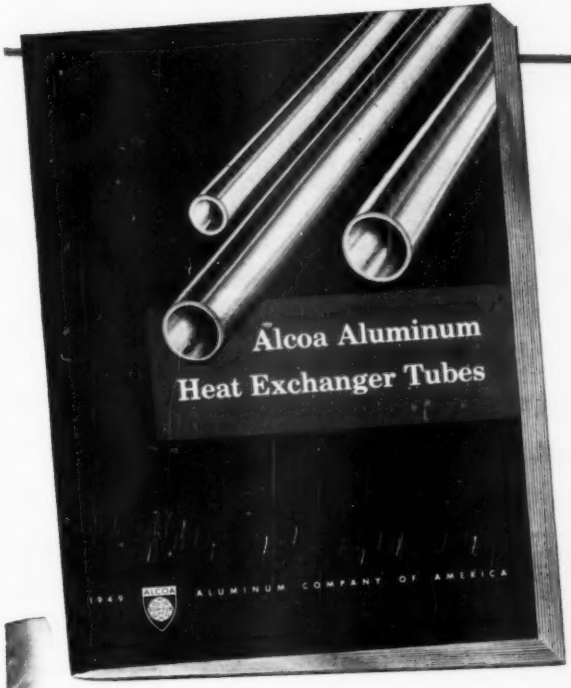
Kidde

LOW COST ALCOA HEAT EXCHANGER TUBES CUT MAINTENANCE TIME!



Heat exchangers can be the weak link in your process chain. Retubing and off-stream time slice a big chunk from operating profits. This book tells how tube bundles of Alcoa Aluminum Tubes (A.S.T.M. Specification B234-48T) stave off replacements. They resist hydrocarbons, H_2S, carbon dioxide. Alcoa Alclad Tubes resist most cooling waters.

Priced at $\frac{1}{2}$ the cost of Admiralty, $\frac{2}{3}$ of cold-drawn seamless steel, $\frac{1}{6}$ of stainless or Monel; they save both maintenance and first-cost dollars. Get all the facts from the booklet, "Alcoa Aluminum Heat Exchanger Tubes". It's free! Ask your Alcoa salesman or write ALUMINUM COMPANY OF AMERICA, 694 Gulf Building, Pittsburgh 19, Penna.

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HEAT EXCHANGER TUBES

ALCOA

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BIG "Army Workhorse" Engine

the same famous GMC "270" that performed so dependably and economically in nearly 600,000 military GMCs . . . with such quality features as Full-Pressure Lubrication, Tocco-Hardened Crankshafts, Airplane-type Main Bearings.

BIG Roomy Comfortable Cab

eight inches wider and seven inches longer than prewar, all steel-welded with 22 per cent greater vision, seats with double the number of springs, automatic built-in ventilation system, complete insulation and soundproofing.

BIG Husky Frame and Chassis

with heavy duty frame of 10.1 section modulus . . . big husky axles, clutch, transmission, brakes and springs. Built to handle gross vehicle weights up to 21,500 pounds and truck and trailer weights up to 37,000 pounds.

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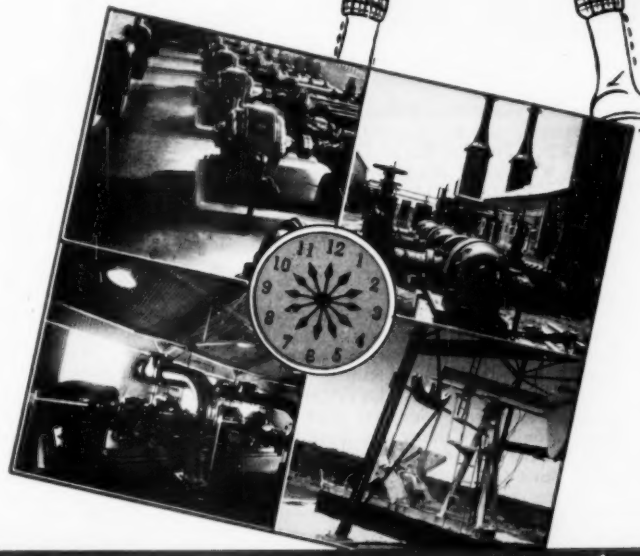
Y'betcha boots, round-the-clock demand doesn't sap Utility Electric Power, on tap all hours to keep bills down! Machinery and manpower waste go out the window. With LOW COST POWER on the job, automatic clock control does the watching. This frees manpower for more directly productive duty, and keeps field and plant payroll in better balance with other costs. In addition, LOW COST POWER equipment costs less initially, the equipment costs less to maintain, it's easier to transport! You owe it to your business to know the facts about application of LOW COST POWER to your operations. Let the Power Engineer tell you — call your nearest Utility Electric Company — do it now!

Depend upon Utility Electric Power for all-around efficiency at lowest-possible-cost maintainable by know-how management.



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SAVE JOB TIME ON 1" TO 2" PIPE!

Toledo No. 1BR Adjustable Ratchet Threader, 1" to 2" Pipe.

Here are the 1" to 2" tools preferred today by thousands of better mechanics . . . genuine TOLEDO THREADERS!

. . . *Toledo 1A Ratchet Threader,* the famous Toledo Tool that pioneered the easy-threading principle.

. . . *Toledo 1BR Ratchet Threader,* similar to the 1A . . . in addition, has pipe holder with broad faced chuck jaws easily set by wing-head thumb screws . . . assures accurate centering and firm grip.

. . . *Toledo SIMPACT Self-Contained Tool* . . . outstanding for easy operation . . . one set of high speed steel dies does the work of four . . . no loose parts . . . sizes changed instantly.

Tool up *right* with TOLEDO—hand tools or power equipment—for every pipe fitting requirement! You'll save time, save labor, cut costs! The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office, No. 2 Rector Street Building.

Toledo No. 1A Adjustable Ratchet Threader, 1" to 2" Pipe.

Toledo SIMPACT—self-contained, adjustable threader, 1" to 2" Pipe.

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FOR PRECISION PIPE TOOLS

Since its very beginning in 1919, W-K-M- Company has devoted its full facilities and energies to producing quality products for the oil industry. Never, at any time, has the company deviated from this one aim: To serve the oil industry completely and satisfactorily, without interference from sources foreign to it.

During these thirty years, we have co-operated to the fullest extent with members of the industry and we are deeply indebted to them for sharing their profound knowledge with us. Because of their willingness to discuss their problems and requirements, we have been enabled to design and produce equipment that has attained remarkable records for service and dependability in fields throughout the world.

When you buy W-K-M equipment, you get the finest . . . products of thirty years experience, designed with the assistance of the best in the oil industry, and produced in a plant that is unsurpassed for efficiency and precision workmanship.

W-K-M Company, Inc.

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

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LOS ANGELES

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Export Office: 30 Rockefeller Plaza, New York, N. Y.

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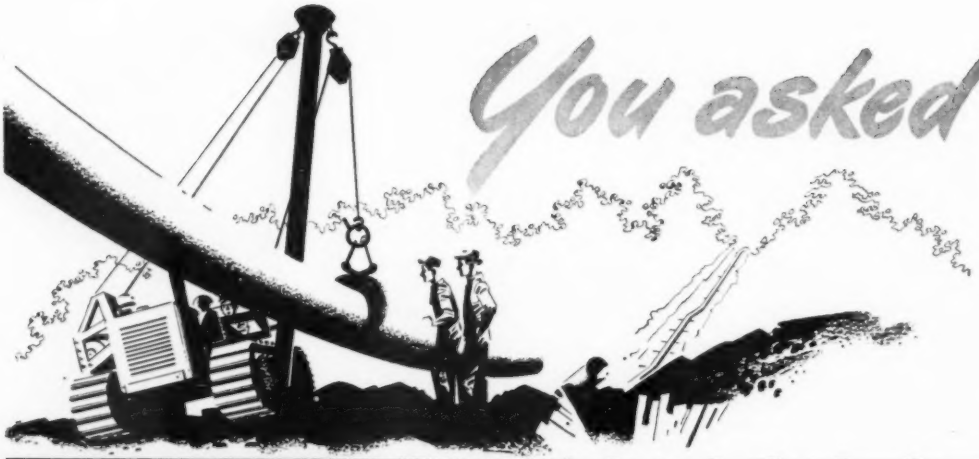
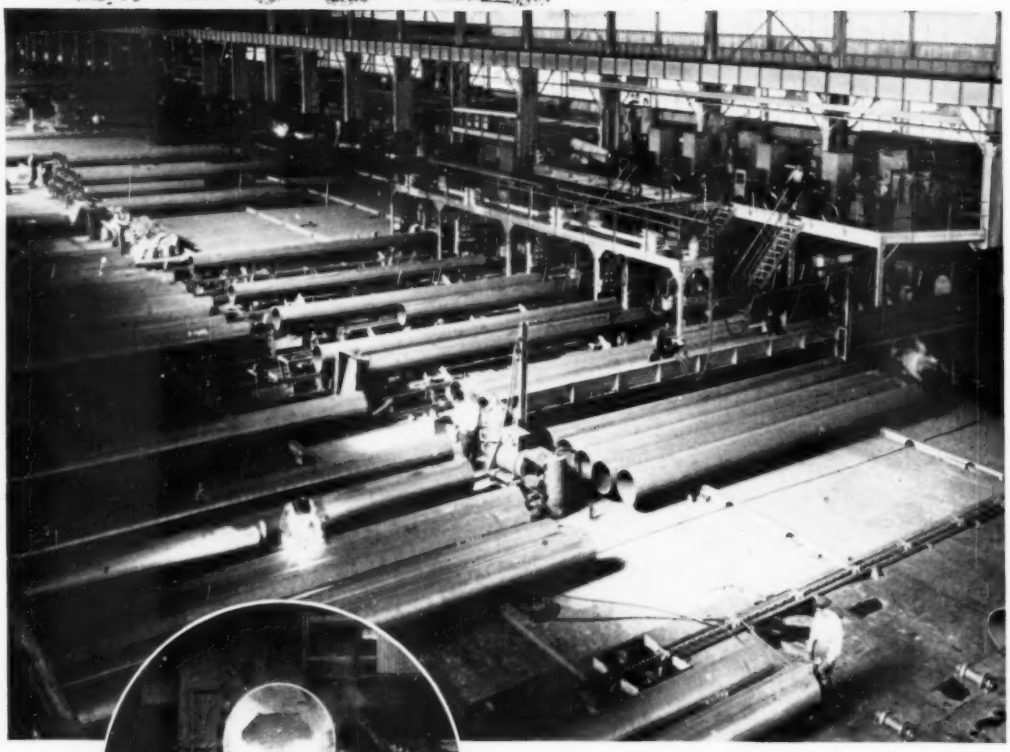


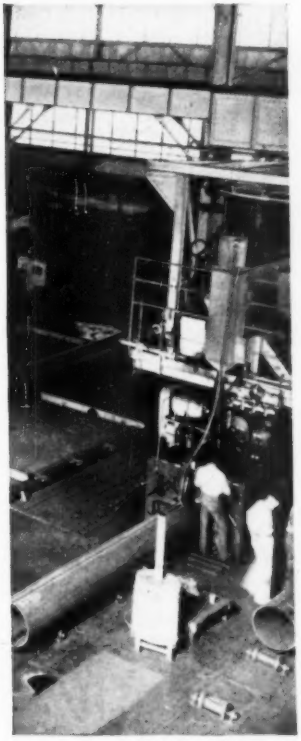


In this new Republic Pipe Mill at Gadsden, Ala., flat-rolled steel is cold formed to shape, electric fusion welded both inside (as shown at the left) and outside, then hydraulically expanded. The results—uniform wall thickness, diameter, roundness, high yield strength, workability and freedom from scale.

for it

. . . HERE IT IS!

. . . A NEW REPUBLIC MILL FOR 20 TO 30-INCH, HIGH-PRESSURE ELECTRIC WELD LINE PIPE



Here is Republic's answer to natural gas shortages, particularly in industrial areas where production losses and layoffs frequently occur during periods of severe cold weather . . . a complete new mill for the manufacture of high-pressure line pipe in large diameters.

Just 20 years ago, Republic pioneered Electric Weld Oil Country Tubular Goods—line pipe, casing and tubing. As of today, more than 51,000 miles of Republic Electric Weld Line Pipe in sizes up to 16-inch O.D. have been laid—indisputable proof of its dependability and economy.

This new mill now brings Republic's range of sizes for gas and oil lines up to 30-inch O.D. Pipe 20-inch and larger is electric fusion welded inside and out by the submerged arc method, then hydraulically expanded to assure uniform size, roundness and straightness, and to increase the strength needed for handling high pressures safely.

In operation since July, 1948, sufficient pipe already has been produced for one complete new line, resulting in considerable improvement in the natural gas supply in the area served by it—as well as for portions of other lines.

There are many reasons why Republic Electric Weld Line Pipe stands out as a safe, dependable and cost-saving medium of transportation for natural gas, gasoline, oil and by-products. Ask us for them.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic Electric Weld Tubular Products are made from flat-rolled steel, both sides of which are open to inspection. Thus the surface which becomes the inside wall is free from hidden defects.

Republic
REPUBLIC STEEL
ELECTRIC WELD LINE PIPE

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

Hurricane *in* Louisiana

A HOT STILLNESS pressed down on Crowley, Louisiana, that August afternoon in 1940. Sweat stood on foreheads . . . breath came in gasps . . . sounds seemed to echo through the humid air. Nothing moved but tiny little whirlwinds, bustling at street corners. The whole town seemed to be waiting

Ten minutes later it hit. A savage hurricane crashed over Crowley. The wind roared . . . the bottom dropped out of the sky . . . 26 inches of rain cascaded on the prostrate community in 36 hours.

Continental Oil Company's bulk plant was the only oil storage that escaped. Conoco Agent Jack Lawrence immediately put himself and the company's plant at the service of the Red Cross. Fuel for all evacuation and rescue boats was available to everybody who could help. Kerosene was rushed to hospitals and first aid stations to provide the only illumination. Agent Lawrence himself used his personal boat to take the doctor wherever he was most needed.

Such service to the community is the dominant principle of the oil industry. Jack Lawrence's feeling of obligation to his neighbors is not unique . . . it is traditional with the men and women who produce, manufacture and distribute petroleum products throughout the United States.

Four generations of men like Jack Lawrence have helped build Continental's 74-year-old record of stability. Thousands like him today are a vital part of our program for growth.

CONOCO **Continental Oil Company**

Natural Gas Producers

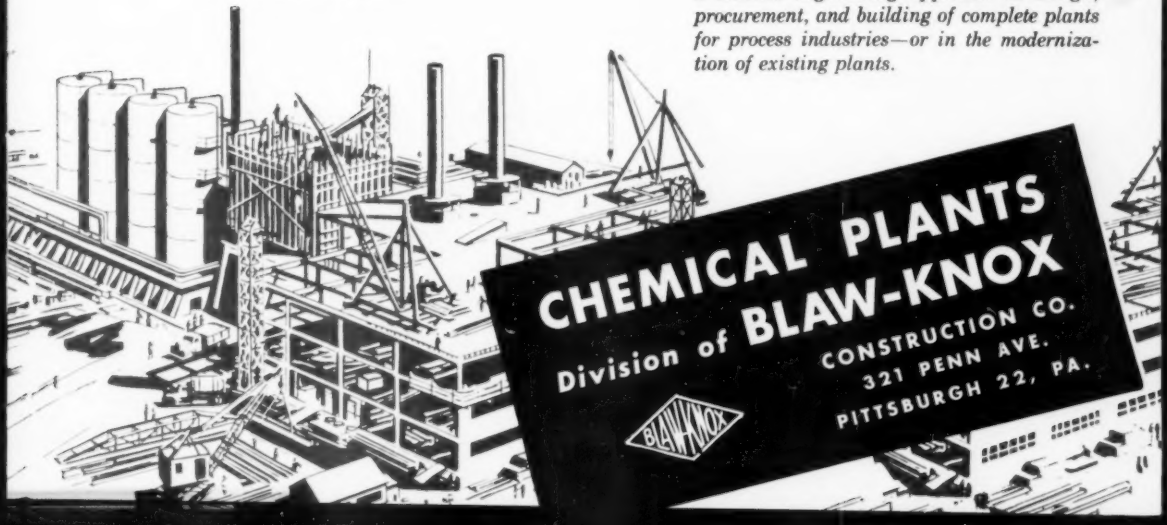
Here's the "PAY-OFF"

EARNINGS from the recovery of raw gasoline from your natural gas quickly pay for a Blaw-Knox Gasoline Absorption and Stripping Plant. Condensible hydrocarbons are removed from the gas, insuring a hydrocarbon dewpoint within limits prescribed by the gas transmission companies. Fractionating equipment may readily be added to produce stabilized gasoline and liquefied petroleum gases.

The smaller plants are ideal for the smaller leases and remote locations. No steam or electricity is required and only a small amount of cooling water make-up is needed. All plants regardless of size are compact, economical and automatically controlled. Ask for Bulletin 2225.

* * *

In this plant, Blaw-Knox again demonstrates a creative engineering approach in design, procurement, and building of complete plants for process industries—or in the modernization of existing plants.



CHEMICAL PLANTS
Division of BLAW-KNOX
CONSTRUCTION CO.
321 PENN AVE.
PITTSBURGH 22, PA.

WATCH THE DIRT FLY . . .

TD-14 bulldozer clears and grades land before digging slush pit.

TD-18 Bullgrader angles blade to make fast work of backfilling pipe-line trench.

When Bucyrus-Erie Blades Tackle Your Oil Field Jobs!

Versatile Bucyrus-Erie Bullgraders and bulldozers make quick work of dozens of oil field jobs — clearing or levelling land for drilling, digging slush or reserve pits, trenches and ditches, backfilling, maintaining roads. On these and many other jobs, Bucyrus-Erie machines are outstanding performers because they're designed with and for International crawler tractors to form a perfectly balanced earthmoving team. Perfect balance means the tractor keeps full track length on the ground at all times, delivering more power to the blade for most efficient work.

Helping hands that more than pay their own way, Bucyrus-Erie Bullgraders and bulldozers bring to oil field work a host of time-proven features that mean high output—scientific blade curvature that keeps dirt rolling with less power expended, easy angling or tilting adjustments that increase Bullgrader effectiveness, safe low-pressure hydraulic system that provides instantly responsive control, and sturdy construction of top-grade steels and alloys that means a long lifetime of productive service. Sold and serviced by International Industrial Tractor Distributors everywhere! 142T49

SOUTH MILWAUKEE BUCYRUS ERIE WISCONSIN

G. W. Johnson, Party Chief on Crew No. 11, is one of the youngest party chiefs on the Independent staff, yet he has rolled up more than 11 years of geophysical experience on every job in a field party. Among Independent's 17 Party Chiefs the average experience is 13 years.

Examine the Record . . .

of Independent's 16 years of successful exploration work

When you contract with Independent you can be certain that the men in charge of your work are long accustomed to getting accurate results efficiently.

Independent crews have done successful surveys in 26 states and foreign countries. More than 100 important oil producers have found profitable satisfaction in the services of Independent Exploration Co.

You are invited to talk with us about your next survey project.

POINTING THE WAY IXC FOR THE DRILL

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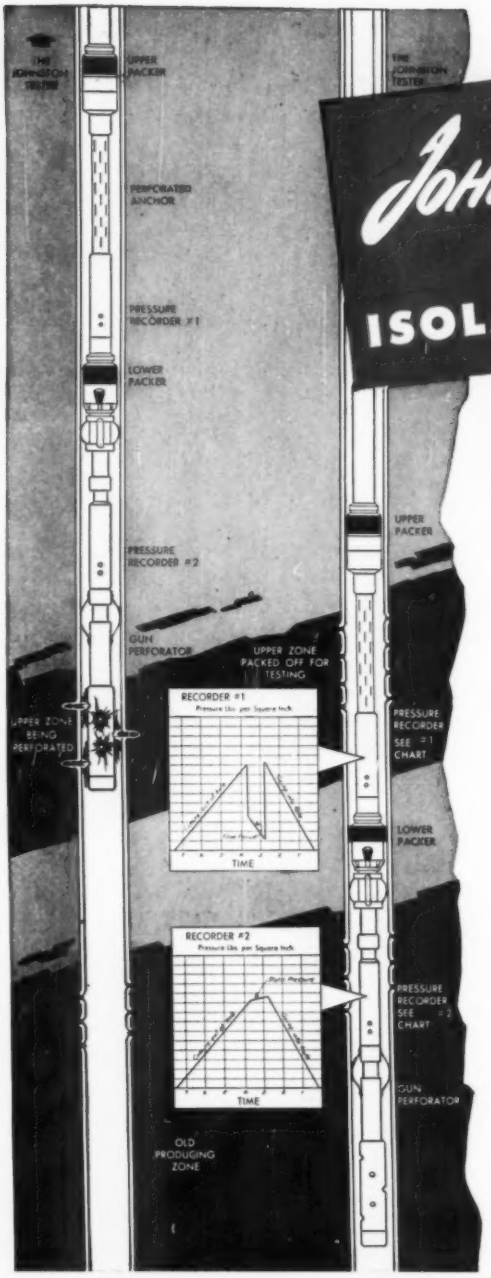

HERE'S THE JOHNSTON COMBINATION FOR TESTING ISOLATED FORMATIONS

SHOOT-IN TEST

Trademark FORMATION AND CASING TESTING — JOHNSTON

HERE'S THE EASY WAY of testing isolated formations . . . it's sure, it's economical and it gives you definite and conclusive isolated formation data in a single run of drill pipe or tubing.

As shown at left, the complete assembly for *both* perforating and testing consists of (1) a regular Johnston Testing Tool; (2) a straddle packer assembly including an upper packer, a perforated anchor, a pressure recorder and lower packer; (3) a second pressure recorder and (4) a regular Johnston Gun Perforator. This Johnston combination of run-in, perforating, packing off and testing is a faster, smoother operation for testing your isolated formations — and it requires only a minimum of down-time!

Call Johnston for your next "isolated" formation job!

SHOOT-IN TEST — Trademark FORMATION AND CASING TESTING

M. O. JOHNSTON OIL FIELD SERVICE CORP.
3035 Andrita Street, Los Angeles 41, California
"Servicing California-Permian Basin-Rocky Mountain Areas"

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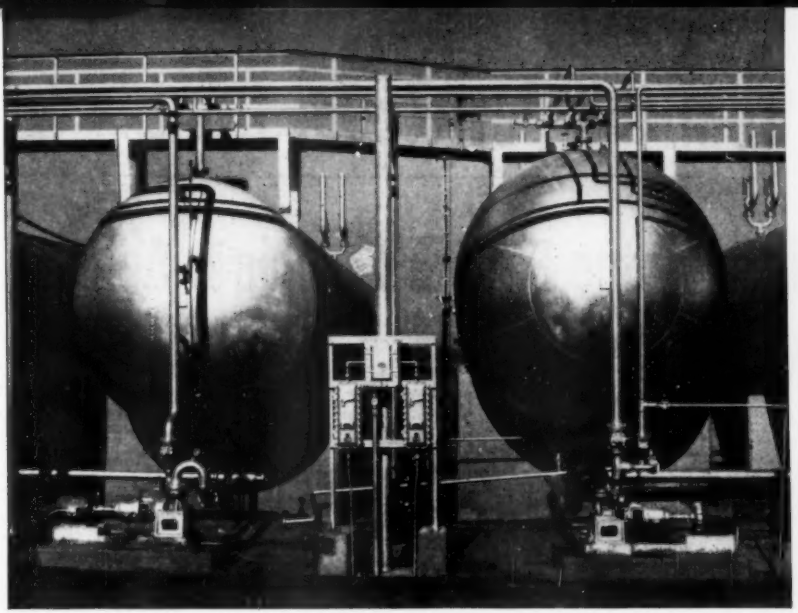
NEWS

FROM THE PETROLEUM FRONT

AS REPORTED BY THE DEVELOPMENT ENGINEERS, FIELD SERVICE REPRESENTATIVES AND CUSTOMERS OF WORTHINGTON



Two 2½ HR I Worthington Centrifugal Pumps in LPG loading service at Skelly Oil Co., Velma, Okla.

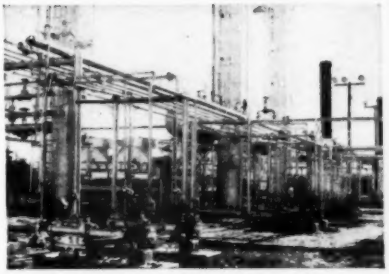
New Arrivals at Skelly Doing Fine

During 1947 and 1948, the Skelly Oil Co., nationally known producers and refiners of oil, installed 8 Worthington Hi-Vols and two Worthington centrifugal pumps in their Velma, Oklahoma plant.

The 8 Hi-Vols (6 x 5 x 12 AO and 8 x 5 x 12 AO) handle Ethane and Hydrocarbons on transfer and still charging in a gasoline plant. Discharge pressures and suction pressures of each pump are 475—525 psi and 100—260 psi, respectively.

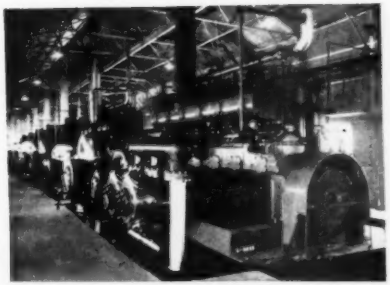
The centrifugal pumps are used on LPG gasoline loading service, pumping light Hydrocarbon and Diethyline Glycol with discharge ratings of 525 and 575 psi respectively.

All pumps are in excellent operating condition according to plant officials.



Worthington Hi-Vol Pumps at Skelly Oil Co., Velma, Okla.

First Again With Petroleum Men



Worthington Angle Compressors at Warren Petroleum Company's plant in Holliday, Texas.

The Warren Petroleum Co., the world's largest marketers and manufacturers of natural gasoline and LPG, have recently added two new Worthington LTC 800 hp Compressors to their compressor line-up at the Gasoline and Pressure Maintenance Plant in Holliday, Texas.

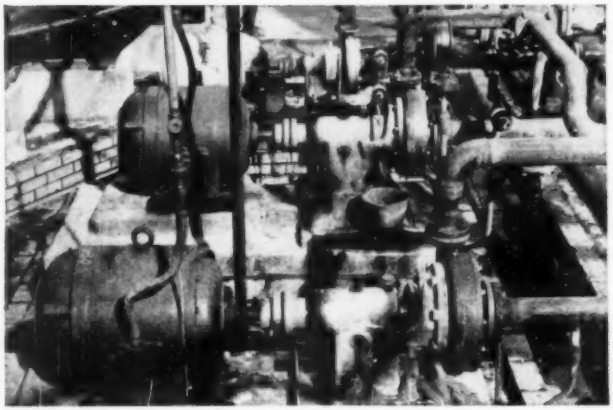
The photograph shows a view of eight Worthington LTC Angle Compressors representing a total of 5,200 hp, for handling wet gas and repressuring. All gas is processed before final discharge pressure of 800 pounds per square inch.

Installation of Worthington machinery began in 1946. Performance has been so excellent, that when officials decided to increase capacity, it was Worthington again that got the order!

9-7

WORTHINGTON PUMP AND MACHINERY CORPORATION, HARRISON, N. J.

Nothing too Fat For Sulphuric Acid



Worthite pumps and valves handling 90% sulphuric acid at Esso Standard Oil Co., Baton Rouge, La.

Esso Standard Oil Company at Baton Rouge, La. installed two 2-CG-3 Worthite Centrifugal Pumps to deliver 90% spent sulphuric acid via pipe line to adjacent Consolidated Chemical Industries plant, where acid is fortified and pumped back to the oil refinery for re-use. Worthite is a machinable, high strength alloy steel containing about 52% alloying elements (nickel, chromium, molybdenum, silicon, copper, manganese).

The pump in the foreground of the photo is equipped with a mechanical seal developed by Worthington. This seal has the unique advantage of resisting corrosion and preventing leakage at the stuffing box, thus eliminating the necessity of valve manipulation to control drip. The seal is effective whether the pump is operating or not.

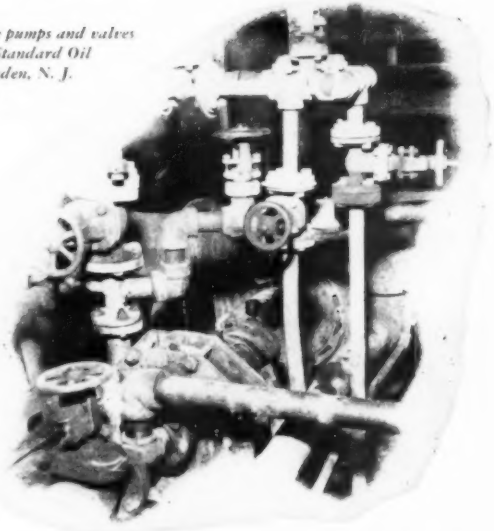
How Esso Handles Fuming H_2SO_4 (Oleum)

The advantages of Worthite for handling .98 to 105% H_2SO_4 has been demonstrated by nine years experience with Worthite pumps and valves at Esso Standard Oil Company's plant in Linden, New Jersey.

The leakage of Oleum from a pump stuffing box could create a very serious problem. Where pressure exists on the pump inlet this problem is much more serious. Conventional use of a water seal is impractical due to the chemical reaction. This problem was solved by throttling a valve in the suction line to create a pressure below atmospheric at the pump suction. The packing in the pump stuffing box now has a much easier function, that of preventing inleakage of air, and gives satisfactory service.

The valves used previously on this service were plug cocks which tended to stick or freeze up, often requiring the use of a six foot bar wrench to turn. This difficulty was overcome by using Worthite gate valves, as shown in the illustration. The Worthite gate valves turn freely and have given many years of trouble-free service.

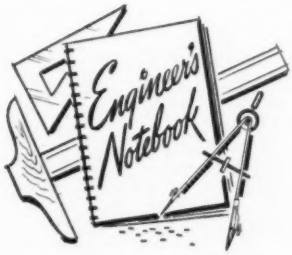
Worthite pumps and valves in Esso Standard Oil Co.'s Linden, N. J. refinery



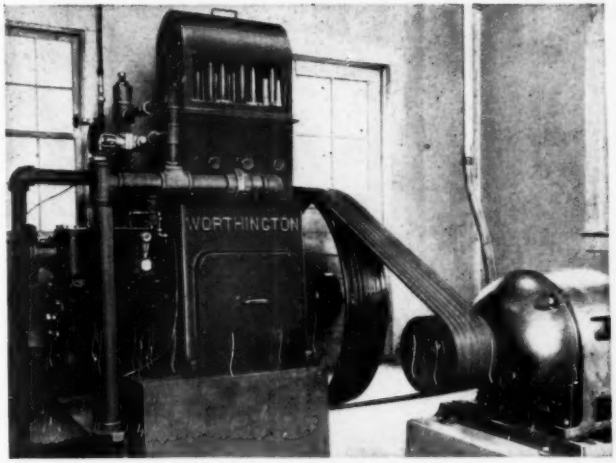
The development of the mechanical seal for Worthite Chemical Pumps has further simplified the solution of the stuffing box problem when pumping Oleum. The seal automatically stops stuffing box leakage without adjustment or throttling on the pump suction. An installation in a chemical plant using the seal has given nearly a year of service without leakage or adjustment.

Worthington Pump and Machinery Corporation
Harrison, N. J.

NEWS



Worthington Pumps for Product Pipelines



Variflo Variable Capacity Pump

The application of pumping equipment to product pipelines requires that special consideration be given to the means used for varying capacity to obtain the maximum through-put at all times.

With the wide variety of products handled in a product line, a maximum through-put can be obtained only when pumping the lightest product, if the operating pressure remains constant. When heavier products having higher viscosities are pumped, the pipe friction due to the greater viscosity increases, and the volume pumped must be reduced if the line operating pressure is to be maintained at the design value. The advantages which are obtained by automatically varying the pump capacity to maintain the desired line pressure are obvious. Stepless capacity control obtained automatically will result in the greatest possible through-put, regardless of the products or combination of products being handled.

The Worthington Automatic Variflo power pump is ideally adapted to this type of operation. Capacity variation is obtained by a very simple mechanism built into the pump crankshaft, and functions on the principle of changing the eccentricity of the cranks at each plunger location. Use of a standard pneumatic type pressure governor provides automatic capacity control from 0 to 100% by adjusting the pump stroke to maintain the discharge pressure constant.

VTE Fixed Stroke Pump

Variation in line capacity between light and heavy products will depend upon the particular pipeline under consideration. Generally, the maximum variation in through-put will rarely exceed 30% of the maximum line capacity. In certain cases, this makes it possible to install part of the pumping equipment in constant stroke constant capacity pumps, reducing the cost of the station. The Worthington fixed stroke VTE pump is identical with the automatic variable capacity Variflo pump, except for the crankshaft and stroke changing elements. All parts normally subject to replacement are therefore interchangeable between the two types of pumps. When the maximum volume handled by the pipeline exceeds the capacity of a single pump, a combination of Variflo and VTE pumps may be installed without sacrificing interchangeability of parts.

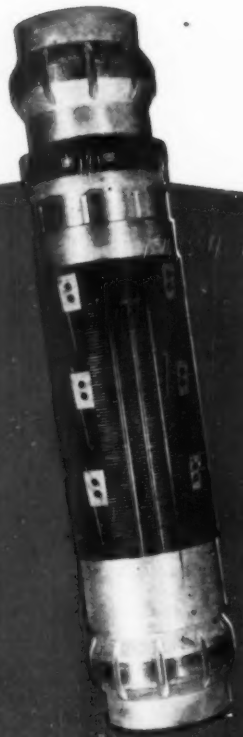
For example, a pipeline operating at 850 psi may be able to handle a maximum of 8000 barrels per day of gasoline, but can only handle 5600 barrels per day of #2 furnace oil, without exceeding the design pressure of 850 psi. One 4000 barrel per day constant capacity, constant, stroke, VTE pump and one 4000 barrel per day maximum capacity variable capacity Variflo pump can be used. The constant capacity pump would operate continuously at 4000 BPD and the variable capacity pump would automatically adjust the capacity of the station within the range 5600 to 8000 BPD and maintain 850 psi discharge pressure.

Furthermore, changes in viscosity and specific gravity, with changes in liquid handles, do not affect the power pump efficiency and maximum efficiency is maintained throughout the operating range of the pipeline.

Capacities up to 5200 barrels per day at pressures of 850 psi can be obtained from the VTE and Variflo Triplex Plunger Pumps.

In addition to pipeline service, the Variflo pump has many other applications such as: boiler feed, process charge, desuperheater feed and water flooding operations.

O-C-T "Precisioneered" Products

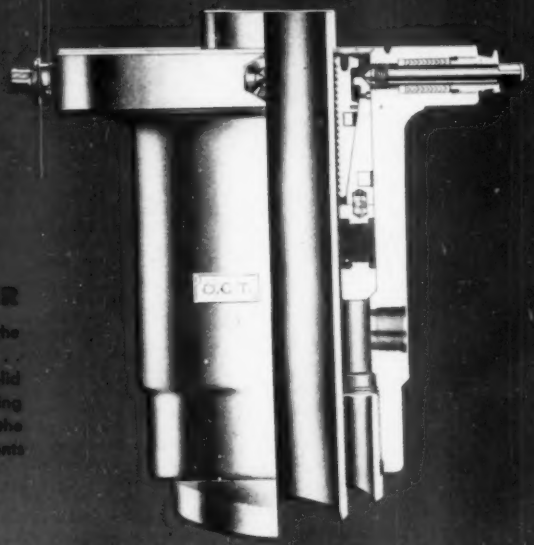


DH-1 "DOWN-THE-HOLE" HANGER

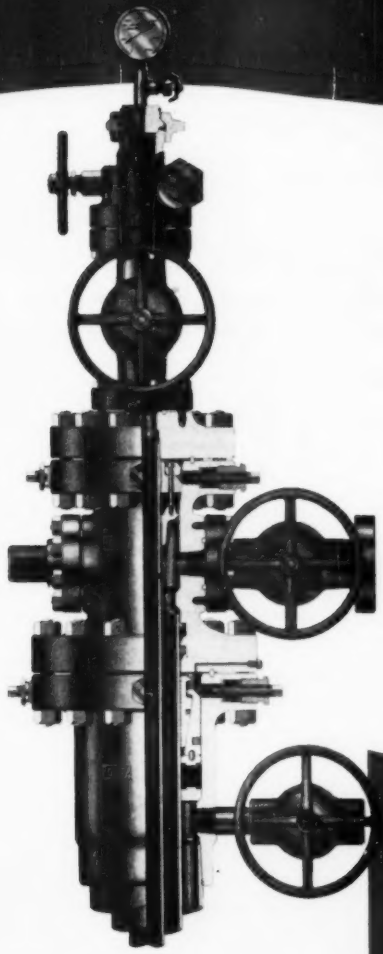
This revolutionary means of putting casing weight down the hole . . . the oil industry's first off-shore casing hanger . . . puts the weight on the outer string at a point where solid formation supports it. Thus, the new O-C-T "DH-1" Casing Hanger eliminates the column load and also eliminates the chances of dropping the inner strings in case of accidents to surface equipment.

C-19 CASING HANGER

The O-C-T "C-19" Casing Hanger . . . which meets every well completion condition with a single compact model . . . is the only slip type hanger that can be wrapped around the casing and seated through the preventers to form automatically a permanent seal between strings before the preventers are unflanged.



help you drill for and produce oil with greater safety



As a result of progressive engineering and precision manufacturing practices, O-C-T now produces a line of "precisioneered" products that have materially increased the margin of safety in drilling, completing and producing high pressure gas and oil wells.

These O-C-T products, for example, were designed with specific oilfield needs in mind . . . manufactured with dependable performance in mind . . . sold with service in mind.

Specify O-C-T "precisioneered" products to help you drill for and produce oil with economy and greater safety.

WRITE TODAY ON YOUR LETTERHEAD FOR COMPLETE ENGINEERING DETAILS ON O-C-T "PRECISIONEERED" PRODUCTS.

WRITE TODAY ON YOUR LETTERHEAD FOR COMPLETE ENGINEERING DETAILS ON O-C-T "PRECISIONEERED" PRODUCTS.

O-C-T HIGH PRESSURE WELLHEAD ASSEMBLY

With the flexible O-C-T "C-19" Casing Head as the foundation, this O-C-T Wellhead and Tree Assembly has set a new standard for simplicity, for service, for safety on high pressure wells.

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

Oil Center Tool Co.

P. O. Box 2091, Houston, Texas

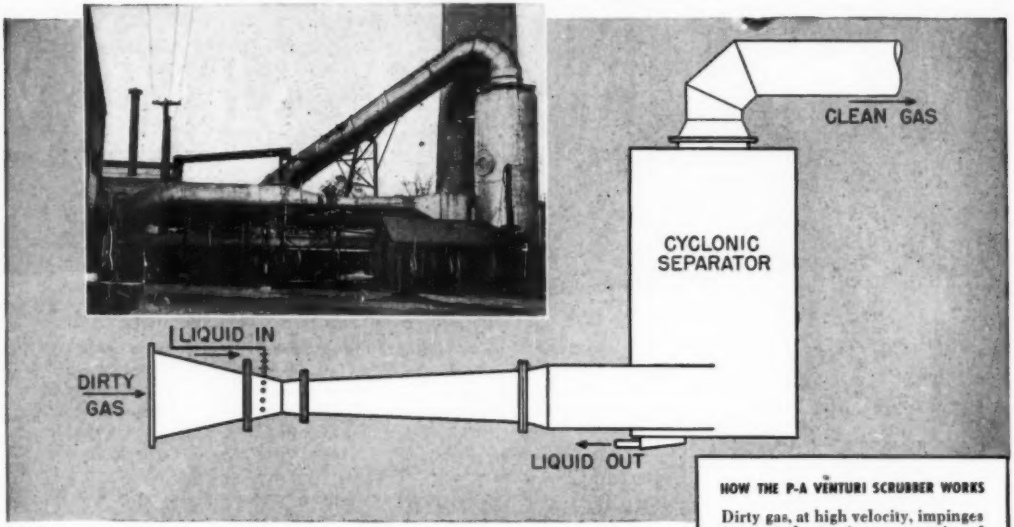
Export Representatives: Venezuela, Colombia, Peru, and Ecuador—Barry & Hall, Apartado No. 354, Maracaibo, Venezuela—Sterling Asset—La Grand, Sandiff & Gell, Ltd., Scarhall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 2091, Houston 1, Texas.

FOR DIFFICULT GAS CLEANING PROBLEMS

CHEMICO *Now Offers*

The P-A Venturi Scrubber

(A PEASE-ANTHONY DEVELOPMENT)



HOW THE P-A VENTURI SCRUBBER WORKS

Dirty gas, at high velocity, impinges upon and atomizes a curtain of liquid introduced through jets at the throat of the Venturi. Differential velocities of gas and atomized liquid result in collision of mist or dust particles with liquid droplets. The coalescence of mist or agglomeration of dust resulting from this collision makes simple cyclonic separation possible.

APPLICATIONS: The P-A Venturi Scrubber is a highly effective and economical apparatus for solving such major industrial problems as: SMOKE ABATEMENT · REMOVAL OF DUST AND MIST FROM GASES · RECOVERY OF VALUABLE METALS AND CHEMICALS.

ADVANTAGES: Highly efficient—Assures virtually complete removal even of sub-micron dust and mist.

Low initial cost—The first cost of the P-A Venturi Scrubber is considerably less than other equipment of equivalent performance.

Low Maintenance — Its maintenance cost is less than that of other equipment of equivalent performance.

Low Water Requirement — Requires generally less water (or scrubbing liquid) than other liquid scrubbers.

Can Handle Gas At Any Temperature—Pilot Plant tests show no difficulties even at 1800° F. Actual installations now operating at 700° to 800° F.

More Compact and Lighter—It requires less space and is lighter in weight than other equipment of equivalent performance.

Simple and Safe to Operate and Maintain—Any competent maintenance man can service a P-A Venturi Scrubber. No special skill is needed to repair equipment.

Chemico's engineering background and development facilities combined with Pease-Anthony's experience in gas scrubbing offers highly qualified service in this field.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BUILDING, 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS, LTD., BRETTENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND

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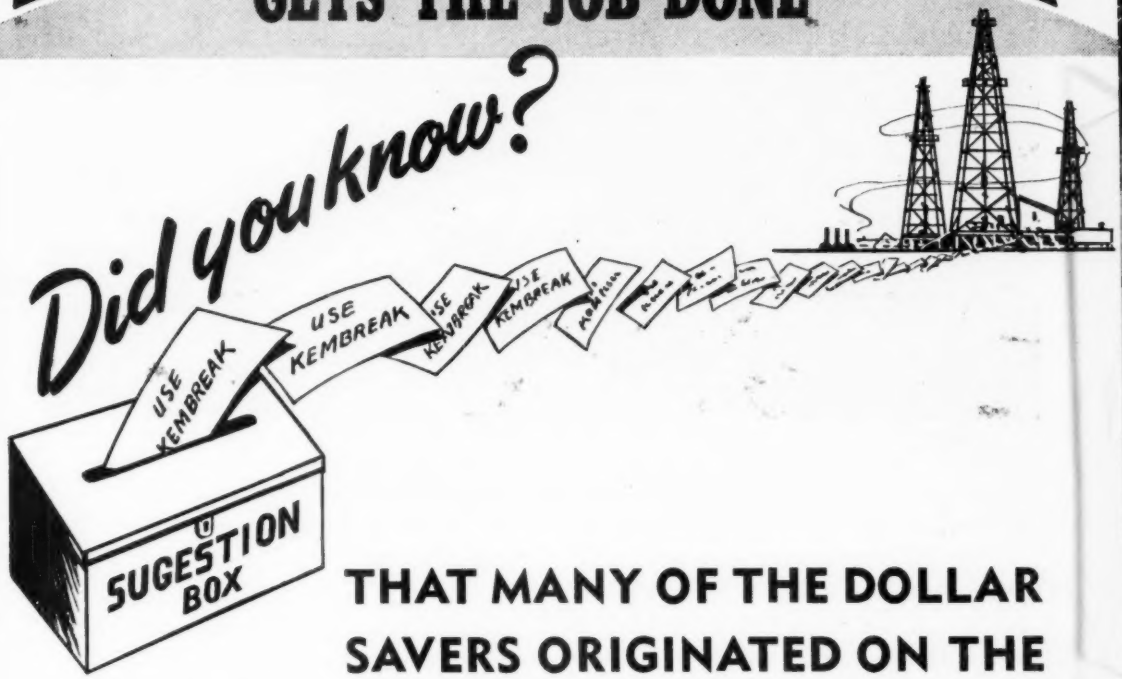
Chemico Plants are profitable investments

KEMBREAK

GETS THE JOB DONE

Did you know?



THAT MANY OF THE DOLLAR SAVERS ORIGINATED ON THE MUD DITCH - AND THAT AMONG THEM IS

KEMBREAK - THE BREAKOVER CHEMICAL

PARTICULARLY EFFECTIVE IN HIGH WEIGHTED LIME BASE MUDS

DISTRIBUTED BY

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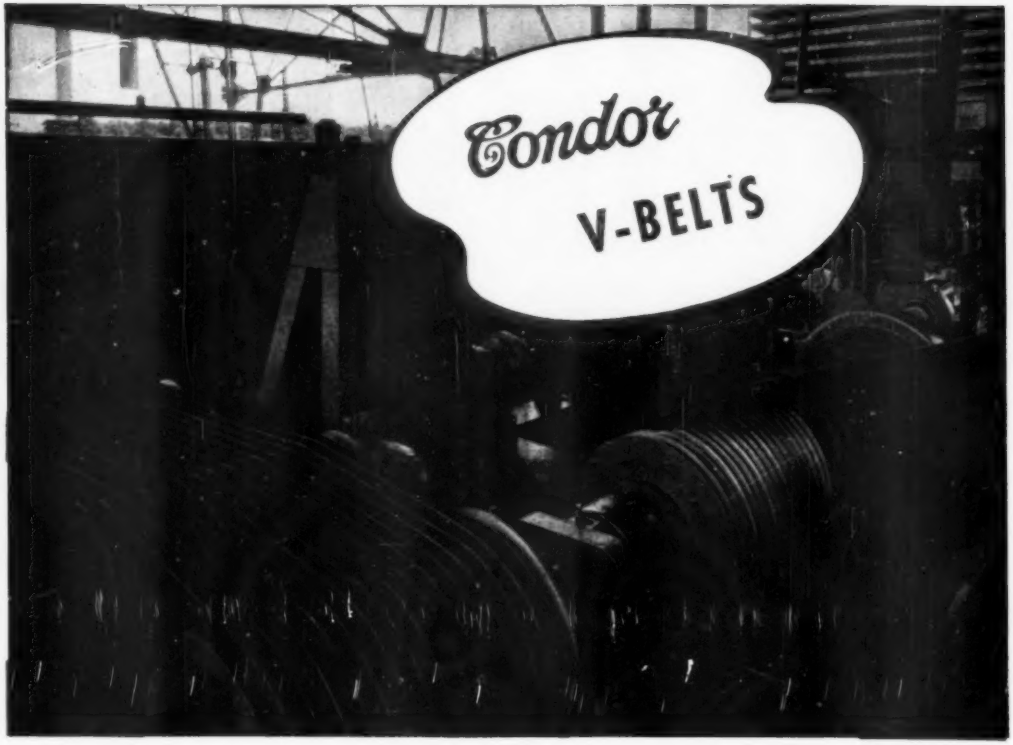


Cut Costs on Diesel Rigs

Manhattan's method of pre-stretching the strength members of Condor V-Belts builds balanced V-belt teams that pull together to cut your belting costs. Every belt pulls its share so no belt takes destructive strains. There is no slippage due to excessive stretch.

Strength members impregnated and covered with Flexlastics insure uniform, cool-running, power delivery. Plenty of cushion assures long wear. Rugged side wall construction gives positive traction grip for maximum power. Heavy duty covers are weather-proof, yet flexible and smooth-running.

You can also profit from the advantage of Manhattan V-belts in Oil-Proof and Non-Spark constructions.

Whatever your requirements, your rigs will run smoother if you equip every part with Manhattan—Rotary Hose, API Flat Transmission Belts, Condor V-Belts, etc. Try Manhattan and compare for quality.

("Flexlastics" is exclusive with Manhattan)

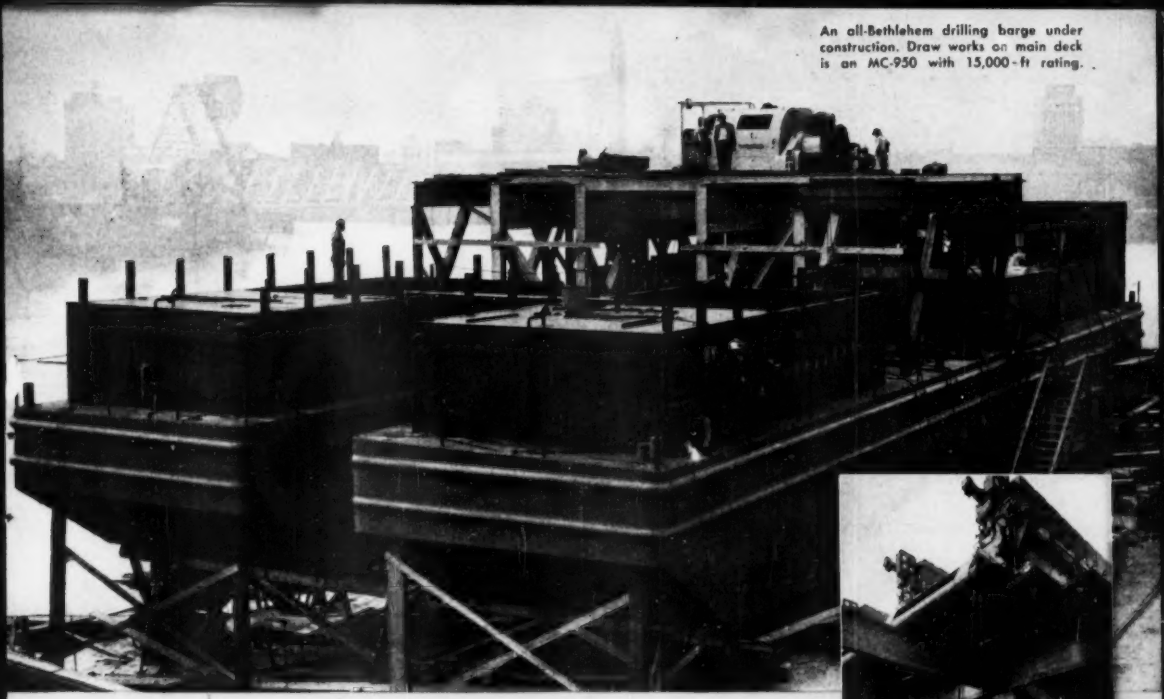
Keep Ahead with Manhattan

RAYBESTOS R M MANHATTAN

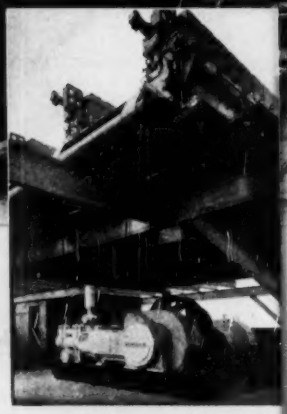
RAYBESTOS-MANHATTAN INC.

MECHANICAL RUBBER PRODUCTS — RUBBER COVERED EQUIPMENT — FRICTION MATERIAL — ASBESTOS TEXTILES
PACKINGS — POWDERED METAL PRODUCTS — ABRASIVE & DIAMOND WHEELS — BOWLING BALLS

MANHATTAN RUBBER DIVISION **PASSAIC, NEW JERSEY**



An all-Bethlehem drilling barge under construction. Draw works on main deck is an MC-950 with 15,000-ft rating.



Slush pumps on this job are powerful Bethlehem G-600's.

Let Bethlehem build it ALL

...from barge bottom to gin pole

In ordering submersible, shallow-water drilling equipment, the customer can now place all responsibility—every single detail—in the hands of one experienced builder, thus relieving himself of countless worries, mix-ups, and complications.

The answer is a "turnkey" job completely built and equipped by Bethlehem, down to the last bolt and nut. At our Gulf Coast yards the barge is designed, engineered, fabricated; drilling equipment, furnished by Bethlehem Supply is installed as the barge work progresses. When the job is delivered, it is ready for immediate service; ready to be towed away to its first drilling assignment.

Bethlehem's organization has had wide, well-rounded experience in the design and construction of drill barges. And Bethlehem Supply has for years manufactured a nationally-known line of rotary-drilling equipment. This combined experience is unique, unduplicated anywhere else in the world.

When you place your order with Bethlehem, you centralize responsibility; gain the advantages of dealing with *one* company, instead of ten or twelve. You gain the services of a unified engineering staff; the services of a large, resourceful purchasing division. Your finished job will be right—and complete—from barge bottom to gin pole. For full details and a history of our experience in this work, we suggest you get in touch with us.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

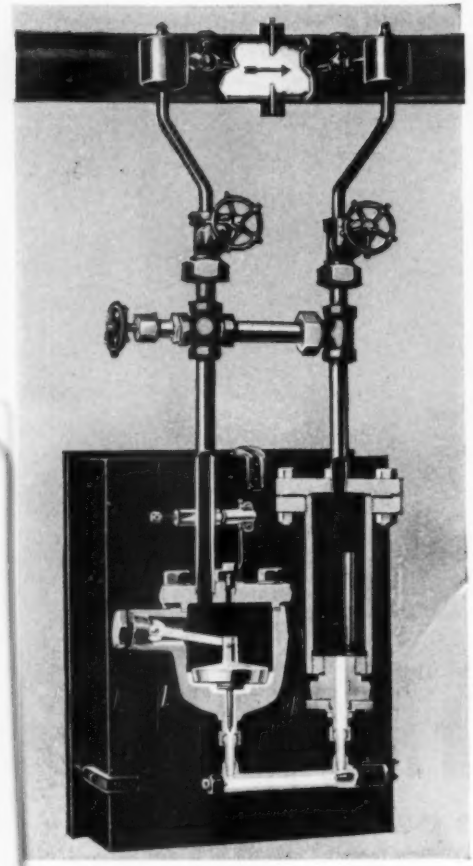
Shipbuilding Division

GULF COAST YARDS: BEAUMONT, TEXAS

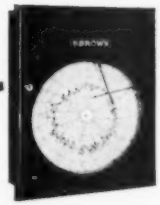
BETHLEHEM SUPPLY COMPANY

GENERAL OFFICES: 21 E. SECOND ST., TULSA, OKLA.

Subsidiaries of Bethlehem Steel Corporation



THIS FLOW METER DOES IT



gives you the benefits of Proved Performance with Easier Maintenance and Lower Upkeep

YES *proved performance through continuous acceptance for years in thousands of installations.*

YES *easier maintenance because it is easily cleaned and calibrated.*

YES *lower upkeep costs because control units and other components are the same as those used in Brown Pressure Gauges, Thermometers and ElectroniK Potentiometers.*

With this Brown Mechanical Flow Meter, control may be obtained through any of four pneumatically operated systems . . . control as precise and accurate as your process justifies.

Maintenance is minimized . . . range tubes are easily changed and can be cleaned in a matter of minutes.

For accurate flow measurement and control, and ease of maintenance and operation . . . you can rely on the Brown Mechanical Flow Meter. Call in your local Brown engineer for free consultation and advice . . . he is as near as your phone.

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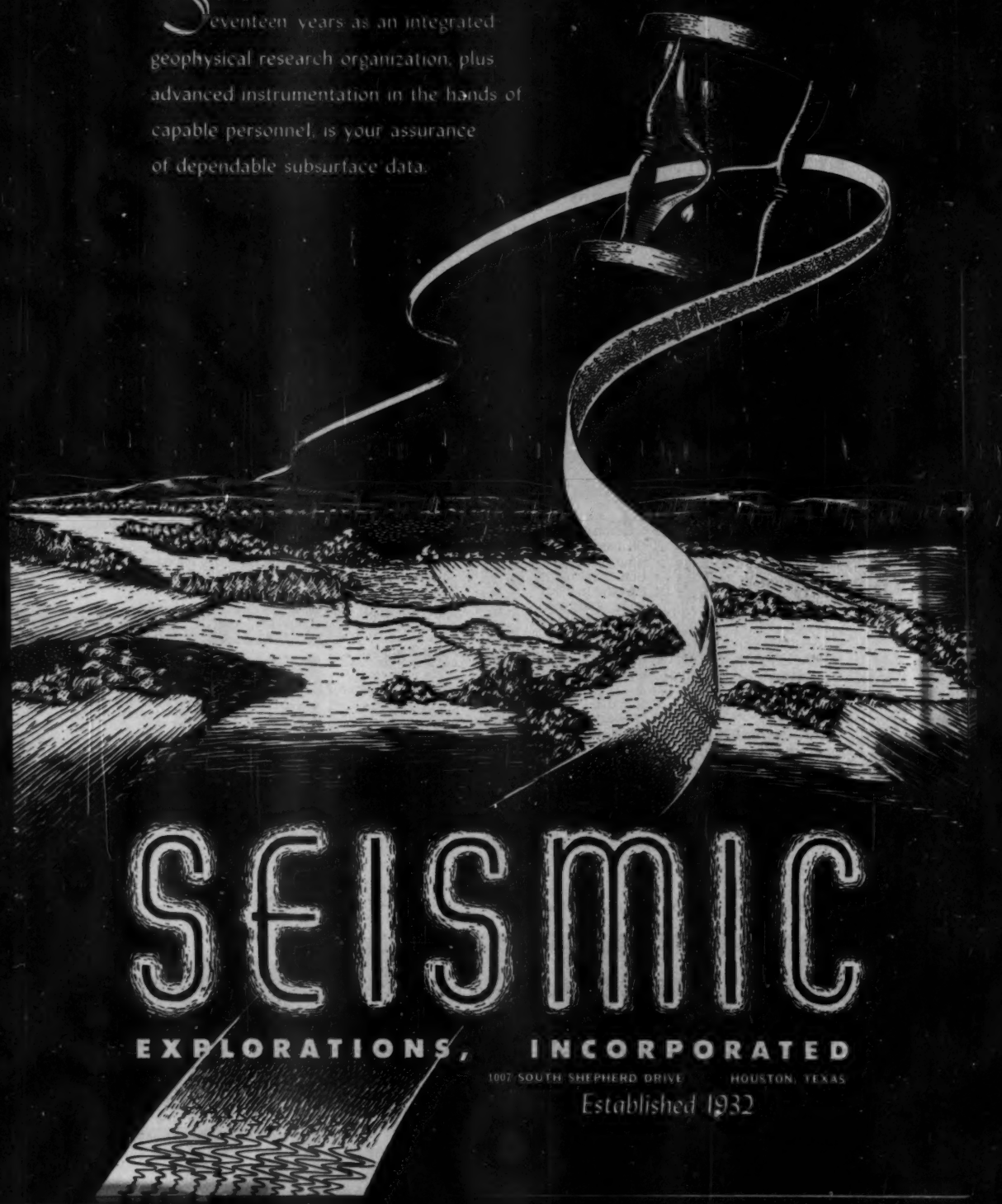
MINNEAPOLIS **Honeywell** *Advanced Instrumentation* FOR THE PETROLEUM INDUSTRY **BROWN** INSTRUMENTS

Seventeen years as an integrated geophysical research organization, plus advanced instrumentation in the hands of capable personnel, is your assurance of dependable subsurface data.



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EXPLORATIONS, INCORPORATED

1007 SOUTH SHEPHERD DRIVE HOUSTON, TEXAS

Established 1932

D+B Rod Liner PUMPS

FOR THE MOST SEVERE PUMPING SERVICE
WHERE ONLY FINEST QUALITY PUMPS SURVIVE

D+B Rod Sectional Liner Pumps are designed, engineered and constructed to provide efficient and economical service under the most severe operating conditions. The precision sectional liner provides a straight, true liner column through which plunger can operate freely.
The advanced design, combined with use of highest quality materials and precision workmanship make D+B Rod Liner Pumps unsurpassed for efficient handling of gassy, sandy or corrosive production from "problem" wells. They are available in a full range of sizes and lengths, with any desired combination of fittings to efficiently pump from any depth in any well condition—a fitting complement to the world famous D+B line of deep well pumps and sucker rods.

STATIONARY BARREL WITH TOP OR BOTTOM HOLD-DOWN

Recommended for corrosive, sandy or gassy production from crooked or slant holes. Regularly equipped with chrome-plated plungers, H-C-I or "Endurall" liners, double valves, Armored or Endurall closed cages, and Superloy balls and seats. Available with either 3-cup or exclusive D+B Simplex top or bottom lock hold-down.

TRAVELING BARREL WITH BOTTOM HOLD-DOWN

Recommended for gassy and sandy production. Particularly effective in moderate sandy conditions with intermittent operation. Standard equipment includes chrome-plated plungers, H-C-I or "Endurall" liners, double valves, Armored closed cages and Superloy balls and seats. Available with 3-cup, A.P.I. or exclusive D+B Simplex bottom lock hold-down.

TRAVELING BARREL CHAMPION WITH BOTTOM HOLD-DOWN

An inverted insert type pump with either 2 or 3 liners and extension tube. Plunger acts as both pull tube and plunger, reducing number of parts and joints. Recommended for sand, shale, or corrosive well conditions. Wiping action of short liner column prevents intrusion of sand between working surfaces. Oversize standing valve, connected to upper end of plunger, permits free, unobstructed fluid flow.

All D+B Rod Liner Pumps are normally equipped with chrome-plated plungers. They are made from thick-walled, seamless steel tubing, heavily chrome plated. They are accurately ground and polished to size and fit desired to assure a perfect seal. D+B "Endurall" plungers for extreme corrosive service may be used.

Hardened cast iron (H-C-I) liners for ordinary pumping, or stainless steel "Endurall" liners for severe service, are normally supplied with D+B Rod Liner Pumps. All D+B liners are centrifugally cast to provide a uniform dense structure free from impurities. They are honed to a mirror-like finish and have a precisely controlled hardness for maximum wear resistance. Standard and Armored liners are available.

D+B Rod Sectional Liner Pumps are equipped with double valve assemblies. They are designed to permit free, unobstructed fluid flow and to provide correct amount of ball lift and side clearance. Gas spinning of ball is eliminated. In operation, the double valve assembly insures perfect seating and long, trouble-free service.

For additional information on D+B Rod Liner Pumps ask for Bulletin No. 611-A

CONTINENTAL

D+B DIVISION EMSCO DERRICK & EQUIPMENT COMPANY
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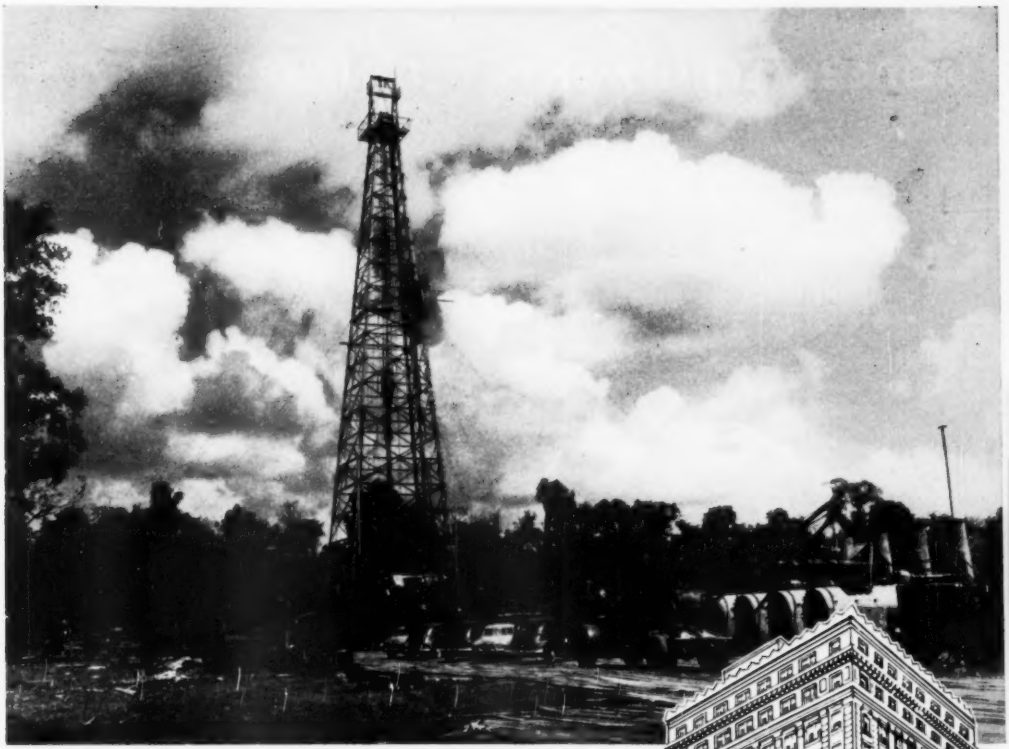
D+B

DEEP WELL PUMPS AND SUCKER RODS



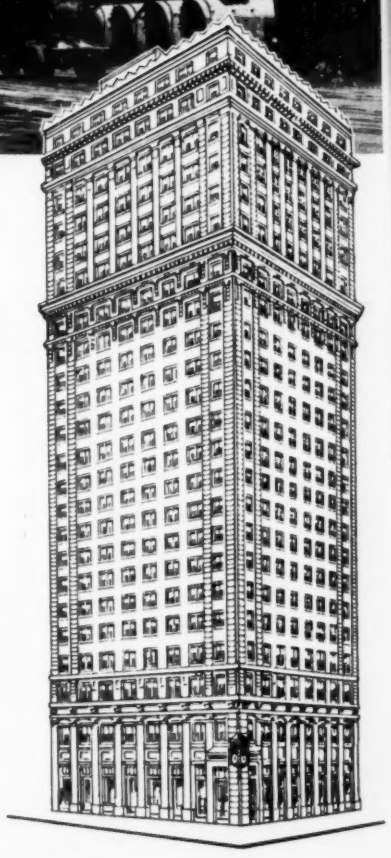
SERVICE THAT PLEASES *OIL MEN*

...the Chief Reason for SECOND NATIONAL'S High Position in the Field of Oil Financing

The consistent growth in the volume of financing handled by the Oil and Gas Division of this bank may be traced to a simple formula of service embodying these fundamentals:

1. A receptive and cooperative attitude.
2. High legal loan limit.
3. A policy of arranging loans in the quickest possible time consistent with sound banking practice.

In the belief that you also will find such service pleasing and effective, The Second National Bank of Houston invites you to discuss your financial problems with the officers of its Oil and Gas Division—practical and experienced men, thoroughly familiar with all phases of oil production and transportation.



The **SECOND NATIONAL BANK OF HOUSTON**

MAIN AT RUSK

CAPITAL AND SURPLUS TEN MILLION DOLLARS . . . MEMBER F.D.I.C.

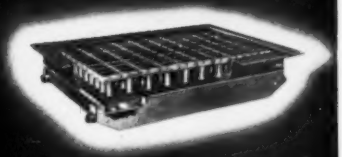
MODERN EQUIPMENT—DEPENDABLE SERVICE

BULLUM BURNER

Oil or combination oil and gas burner designed to operate efficiently with complete atomization and without flame pulsation.

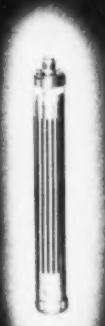
BANNON FEED WATER HEATERS

are designed to stand up under rough treatment. Easily portable yet ruggedly built, they provide an efficient heating and treating unit for drilling boilers.



BECK "MELLOBLU" GAS BURNER

Increases the capacity of the boiler beyond its normal rating, more complete combustion at low gas pressures.



"TOTCO" DRIFT RECORDER

Provides immediately available permanent records for vertically controlled drilling. Due to simplicity and ease of operation by regular crew, operating efficiency of 98% is obtainable.

LUCEY

OTHER LUCEY EQUIPMENT

Lucey Power Drilling Rigs
Lucey Electric & Diesel Electric Hook-ups
Lucey Boilers & Insulation Casings
Wheland Rotary Drilling Equipment
Chain Belt Company—Sprocket & Roller Chain
Cable Drilling & Fishing Tools

Distributors of
Hughes Rock Bits & Tool Joints
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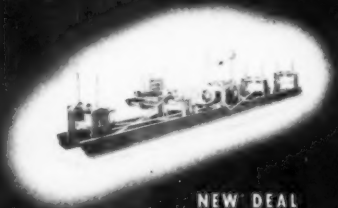
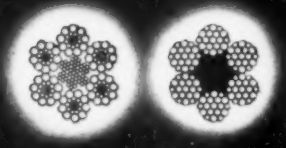
"COOPER" DIE-FORMED BASKET

With this tool, it is not necessary to circulate, make hole or rotate in order to pick up rock-bit cones or other junk. The basket fingers scrape the bottom of the hole and catch everything in one grab.



NEW DEAL PIPE CLEANING MACHINES

. . . provide rapid, dependable and efficient operation. Built in three models and several sizes to meet varied requirements.

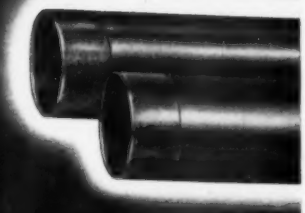


6x19 FLEXIBLE SEALE

6x19 WARRINGTON

UNION WIRE ROPE

Dependable and long lasting. Fabricated in different grades and in all standard sizes.



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Casing Tubing
Drill Pipe Boiler Tubes
Line Pipe

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THIS IS THE TESCO HALLMARK

SYMBOL OF QUALITY STEEL CASTINGS

Now,

you'll see it on more and more STAINLESS STEEL CASTINGS

For more than 20 years, TESCO has stayed ahead of changing Gulf Coast industry demands for quality steel castings.

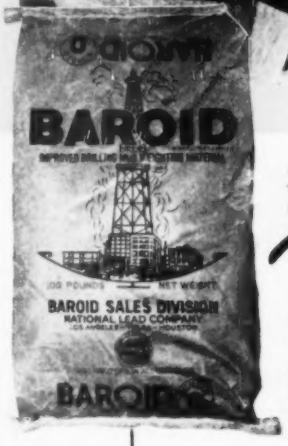
In keeping pace with the industrial growth and needs of this area, TESCO now makes heat and corrosion resistant castings from a pound to a ton, carefully controlled through constant laboratory analysis exactly to customer specifications.

TESCO is right in the middle of the industrial Gulf Coast . . . on the spot to better service the steel casting needs of this area. The TESCO Representative and TESCO Metallurgists will be glad to discuss your stainless or carbon steel casting problems with you.

TESCO IS THE MOST EXPERIENCED FOUNDRY ON THE GULF COAST

TEXAS ELECTRIC STEEL CASTING CO.

GOOD CASTINGS — CARBON AND ALLOY STEEL — HOUSTON, TEXAS



The Pioneer Mud Weight Material Still Leads the Field

Year in and year out the demand for Baroid has exceeded that for any other weight material. Here are some of the reasons:

1. Quality of product. Baroid is the product of the finest raw barytes processed in the most modern milling equipment in Baroid plants at Magnet Cove, Ark.; Fountain Farm, Mo.; and Merced, Cal. The finest mud laboratories carefully check the manufacturing process.

2. Easy availability. Hundreds of distribution points throughout the United States and Canada provide operators with a reliable supply of Baroid when and where they want it.

3. Unequaled field service. Users of Baroid and other Baroid products receive the benefit of the finest drilling mud field service. More than 100 Baroid field engineers with their completely equipped cars or planes stand ready at all times to service the drilling mud on wells in every active oil area.

For these reasons thousands of operators prefer to use Baroid to control formation pressures, check the caving tendencies of incompetent formations, dry and clean drill pipe, and even to prevent one type of circulation loss. To obtain the latest data on the technical aspects of Baroid and its application, fill out and mail the coupon below:

PATENT LICENSES, unrestricted as to sources of supply of materials, but on royalty bases, will be granted to responsible oil companies and others desiring to practice the subject matter of any and/or all of United States Patents Nos. 2,041,086; 2,044,758; 2,064,316; 2,119,829; 2,294,877; 2,387,694; 2,393,165; 2,393,173; 2,417,307; and further improvements thereof. Applications for licenses should be made to Los Angeles office.

Baroid Sales Division, Department A-8
P. O. Box 2258, Terminal Annex, Los Angeles 54, Calif.

Send me detailed information on BAROID drilling muds.

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BAROID SALES DIVISION
NATIONAL LEAD COMPANY
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ECONOMY

Economy in plant design and construction starts with an *attitude of mind* — a willingness to apply to the practical problems of the low-cost plant the same enthusiasm given to "perfectionist" designs.

Operating economy is sought by process and design ingenuity, rather than by ultra-refinement of specifications beyond the economic limit.

Economy is carried through construction by an organization so closely knit that the lessons of past experience are fully utilized. Savings conceived in design accumulate through drafting, purchasing and construction.

LUMMUS builds and designs with

fulfillment
teamwork
resourcefulness
perspective
ECONOMY
technique

ECONOMY by prototype—Time was money, in furnishing a new solvent dewaxing lube oil plant to replace one destroyed by fire. Lummus completed the job in 20 weeks—saved in first cost as well—by adapting the well-established features of previous designs. Four subsequent units followed the same prototype. This approach to standardization offers many opportunities for savings.

ECONOMY by conversion—A newly completed modernization project has converted a 19,000 B/D topping-cracking unit, running on sweet crude, to a 30,000 B/D combination topping-coking plant handling sour crude. Existing towers, heaters and other facilities were utilized. The coking unit was first built around existing facilities, without interfering with operations.

ECONOMY by expediency—This smaller customer had rigid limits of first cost for its lube oil plant. Lummus accepted the challenge—the design was developed to permit use of existing and rebuilt equipment—located and purchased by Lummus for the job. This plant has maintained a high operating record and low operating costs.

ECONOMY by experience—An experienced, well-knit organization was the key to economy on this atmospheric and vacuum distillation unit, designed, delivered and completed in South America all within 6 months. By foreknowledge of shipping procedures, local labor conditions and careful planning, costly "emergencies" were avoided in advance.

THE LUMMUS COMPANY
420 Lexington Avenue, New York 17, N. Y.

LUMMUS

CHICAGO—600 South Michigan Avenue, Chicago 5, Ill.
HOUSTON—Mellie Esperson Bldg., Houston 2, Texas
The Lummus Company, Ltd., 525 Oxford St., London, W-1, England
Société Française des Techniques Lummus
39 Rue Cambon, Paris 1er, France
Compañía Anónima Venezolana Lummus—Edifico "Las Gradillas"
Esquina Las Gradillas, Caracas, Venezuela

OIC Gate Valves installed in WORLD'S LARGEST GASOLINE PLANT Located in Garvin County, Oklahoma.

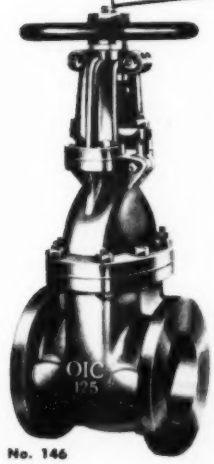
O-549-7

OIC

SETS THE PACE IN VALVES

FOR EVERY OIL COUNTRY USE

WARREN PETROLEUM CORPORATION in building and operating the WORLD'S LARGEST GASOLINE PLANT for The Texas Company, Carter Oil Company, J. E. Crosbie, Incorporated and Cities Service Oil Company and themselves elected to use OIC Valves because of their efficiency in flow control requirements. Reasons? Dozens!



No. 146

Not the least, of course, is OIC's *long* line. It fills the petroleum field's needs for a wide variety of valves which function with absolute precision and safety for long periods of time. You're *safer* with OIC Valves, because materials for both trim and pressure-containing parts are selected for their utility in *all* the applications for which the valves are recommended. Special trims and combinations of trims for special applications are also available.

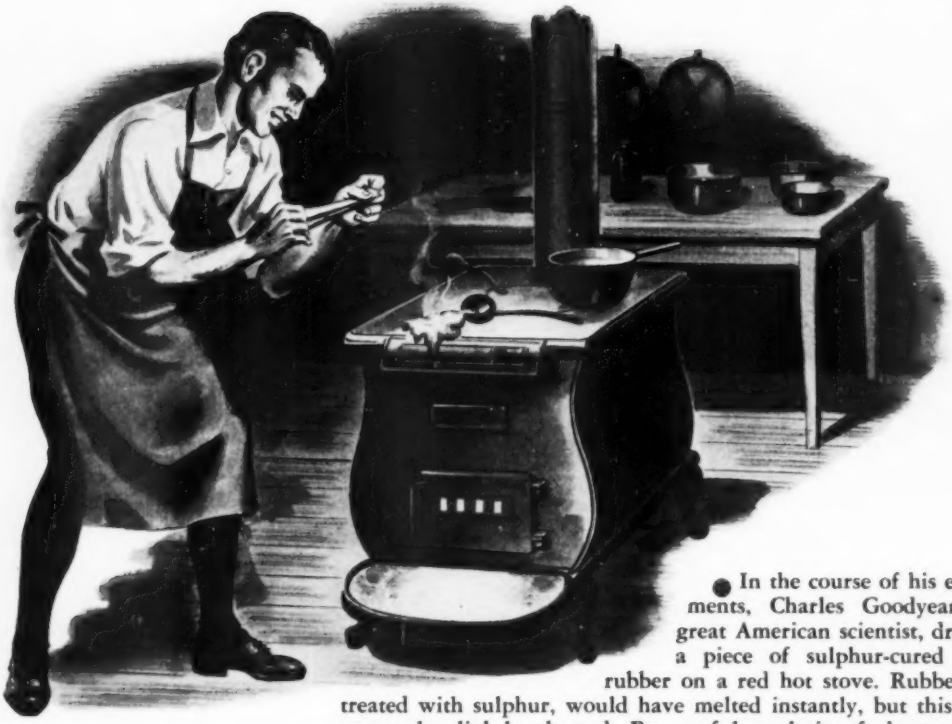
In addition, you get valve features such as leakproof joints to guard against pressure-drop . . . streamlined design to protect flow from turbulence . . . heavier construction to keep pressures and stresses in leash . . . wedges of heavy I-beam design for *positive* flow control . . . integral body ribs to effectively reduce vibration and wear.

It's easy to see why, in "the oil country", OIC Sets the Pace in Valves!

THE OIC CROSS REFERENCE CHART eliminates your valve replacement problems. Simply check the number of the valve on the line, turn to the OIC chart and find the correct replacement valve. Get your free copy from **The Ohio Injector Company, Wadsworth, Ohio.**

OIC VALVES

FORGED STEEL • CAST STEEL • IRON • BRONZE



● In the course of his experiments, Charles Goodyear, the great American scientist, dropped a piece of sulphur-cured India rubber on a red hot stove. Rubber, untreated with sulphur, would have melted instantly, but this piece was only slightly charred. By careful analysis of these results, Mr. Goodyear discovered vulcanization.

Correct interpretation gave the world a process which accelerated transportation, with its resulting benefits to mankind.

● It takes *correct interpretation,* along with good equipment and trained crews, to get accurate results in seismic exploration, too. McCollum Exploration Company has been a recognized leader in subsurface exploration for more than a quarter of a century. Experience, so vital in making reports to guide costly drilling projects in the oil industry knows no substitute. Get the benefit of this experience by using McCollum Exploration experts for land or marine seismic exploration.

McCOLLUM SINCE 1923
Exploration Company

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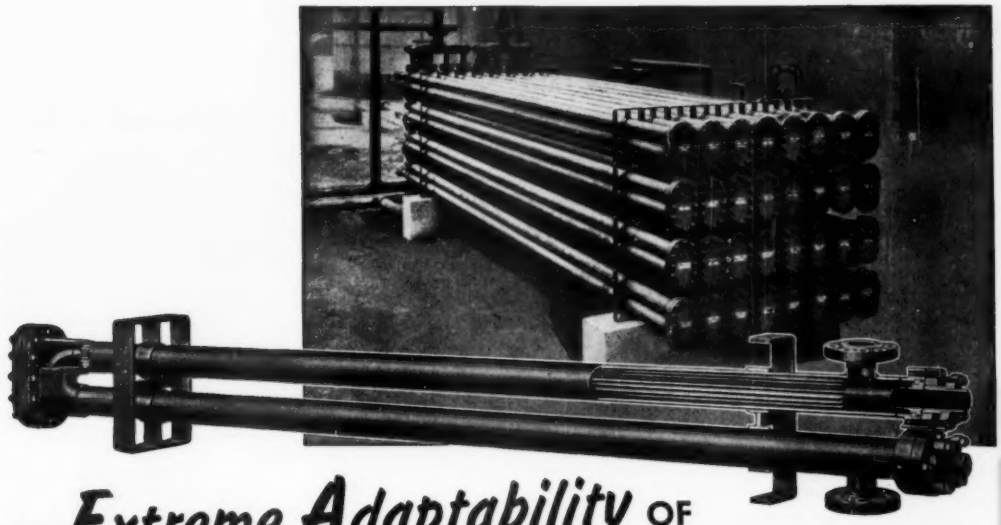
DOMESTIC AND FOREIGN EXPLORATION

Pioneers in

Refraction Shooting • Reflection Shooting • Well Shooting • Marine Shooting



THE *Extreme Adaptability* OF

BROWN FINTUBE SECTIONAL HAIRPIN HEAT EXCHANGERS

Enables users to keep production abreast of changing market and seasonal conditions

● Unlike "bundle" type exchangers, which are custom built for a definite and fixed duty, Brown Fintube Sectional Hairpin Heat Exchangers give operating men almost unlimited flexibility to meet changing requirements. The capacity of the bank can be increased by adding additional sections to the original installation. Capacity can be decreased by valving off one or more of the parallel streams,—or reducing the number of sections in each stream. The entire bank can be changed from one duty, to another and totally different duty, by remanifolding the sections in different series-parallel arrangement. And the bank can even be disassembled, and the sections then reassembled as two or more smaller exchangers on different duties, in different plants.

Let us help you in adapting Brown Fintube Sectional Hairpin Heat Exchangers—with their many outstanding operating and maintenance advantages—to your next heat transfer requirement. The Brown Fintube Co., Elyria, Ohio. Sales engineers in the principal cities.

8 ADVANTAGES

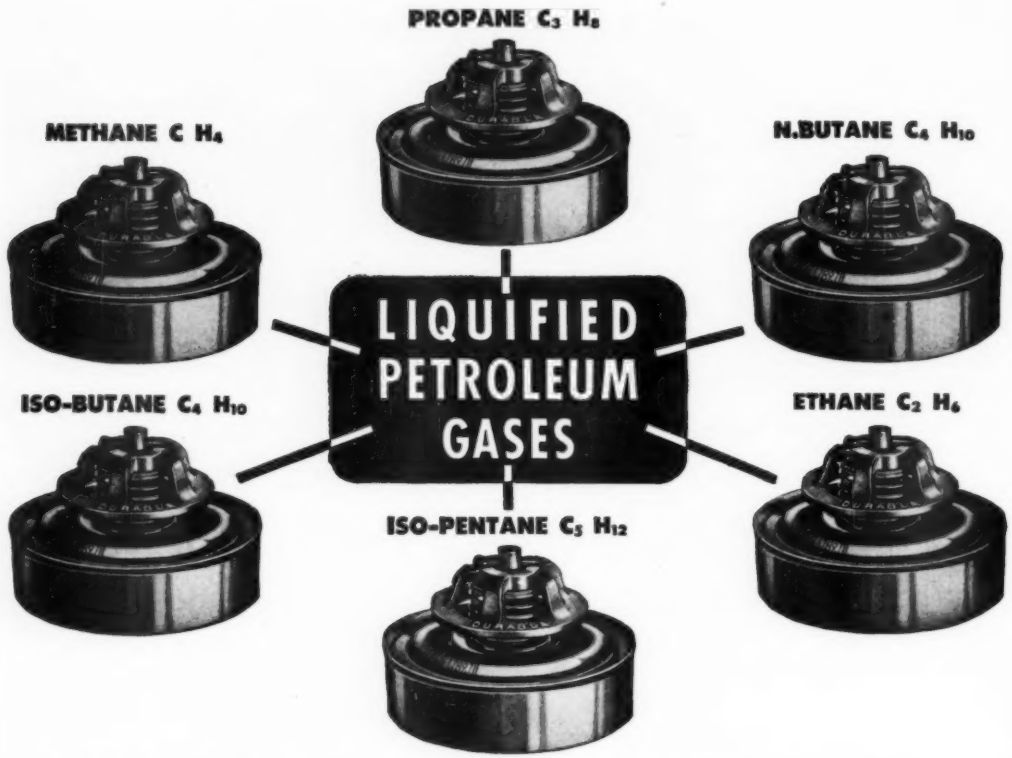
BROWN FINTUBE
Sectional Hairpin
HEAT EXCHANGERS

1. Flanged Shell Seal and Flanged Union Head End Assembly.
2. Extreme Adaptability to Meet the Requirements of Changed Duties.
3. No Obsolescence.
4. Easy Inspection and Maintenance
5. Continuous Operation. No Shut Downs for Servicing.
6. Minimum Investment in Replacement Parts.
7. The Brown Resistance Welded Integrally Bonded Fintube.
8. Easily Removed Rear End Cover Plate.

Write today for Bulletin No. 481. It gives full details

BROWN FINTUBE
Sectional Hairpin
HEAT EXCHANGERS

RESISTANCE WELDED INTEGRALLY BONDED FINTUBES AND FINTUBE HEAT TRANSFER PRODUCTS



DURABLA PUMP VALVES FOR LIGHT HYDROCARBONS

When close clearance or any other design of reciprocating pumps are used for handling the greatly increased production of light hydrocarbons, DURABLA METAL PUMP VALVE UNITS* are your guarantee of high performance, freedom from "gassing" and replacement problems. The arched and curved shape of the valve member absolutely minimizes "slip", cavitation, and turbulence. DURABLA Valves are precision engineered, especially for this service.

Pump valves all open with a tilt action towards the flow line or line of least resistance. DURABLA Valves, being free-tilting, follow this natural law, which is not possible with high hub stem-guided valves or wing guided valves where large side friction is caused when they attempt to tilt in accordance with this basic law . . . and no other free tilting valve is as light as the DURABLA Valve.

ONLY DURABLA OFFER ALL THESE ESSENTIAL FEATURES FOR LIGHT HYDROCARBON SERVICE

- **Feather Weight Valve Member**
- **Free-Tilting Valve Member Without Side Friction**
- **Snap Action Under Any Load**
- **Positive Seal Independent of Contraction and Expansion of Gases**
- **Does Not Need Lubrication**
- **Compact Design, Stocked in 11 Standard Sizes to Fit Any Pump**

Write DURABLA Engineering Department for information and Bulletin, Reference 9G5

*Patent Numbers 2090486, 2117504

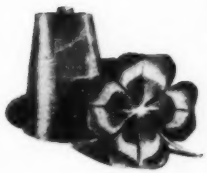
DURABLA MANUFACTURING COMPANY
114 LIBERTY ST. NEW YORK
BRANCHES IN PRINCIPAL CITIES. FOR CANADA REFER: CANADIAN DURABLA LIMITED, TORONTO

Want to make something out of it !

The textile company that settles on the Texas Coast this year will find the *good fortune* that derives from good judgment and leadership. Here are all the textile industry's raw resources — 28% of U. S. cotton; 21% of U. S. wool; 84% of U. S. mohair; a growing production of synthetics —*plus* the economy, efficiency and cleanliness of *natural gas*. The climate is mild, January through December; workers are plentiful, intelligent, cooperative.

You can make something out of that combination. You can make 1949 your year of opportunity. Move your mill **to the Texas Coast.**

Write, wire or telephone for a detailed survey, or special information. Or visit us this month while it's cold up North; it will be a real pleasure to show you around.



HOUSTON PIPE LINE CO.

Subsidiary of Houston Oil Company of Texas — GEO. A. HILL, JR., President

Wholesalers of **Natural GAS**

Good fortune awaits textiles in Texas:

raw fibres ● unsurpassed rail and water transportation ● a fine, mild climate ● excellent industrial relations ● an abundant supply of economical, efficient **natural gas for fuel.**

One of a series of advertisements which have appeared recently in national publications. Purposes to bring the varied resources of Texas to the attention of the Nation's industrialists.

You Get All 3

ACCURACY . . .
FLEXIBILITY . . .
RUGGEDNESS . . .

in the REPUBLIC *Pneumatic Transmitter*

When selecting a meter, whether it be for the measurement of flow, pressure, liquid level or liquid density, the experienced operator looks for these three important features.

He wants a meter that will give him accurate readings. He wants a meter that can be easily adapted to widely varying conditions. He wants a meter that is rugged enough to remain in service even under adverse operating conditions.

The Republic Pneumatic Transmitter has a guaranteed accuracy of within ½ of 1% of the transmitter range. This is higher than can be consistently secured and maintained with any other method. By making a few minor adjustments or substituting a few small parts its operation can be easily changed to any desired range between a minimum of 0—0.6″ of water to a maximum of 0—704″ of water. Its construction is more like that of a precision machine than of the sensitive instrument that it is.

It is for these reasons that the Republic Pneumatic Transmitter, even though comparatively new, has already been specified and installed on over 2500 industrial metering applications.

★ ★ ★

The Republic Transmitter is a pneumatic metering device. It employs the force-balance principle to convert process variables such as flow, liquid level, pressure or liquid density, into air pressures which vary proportionally with the process variables.

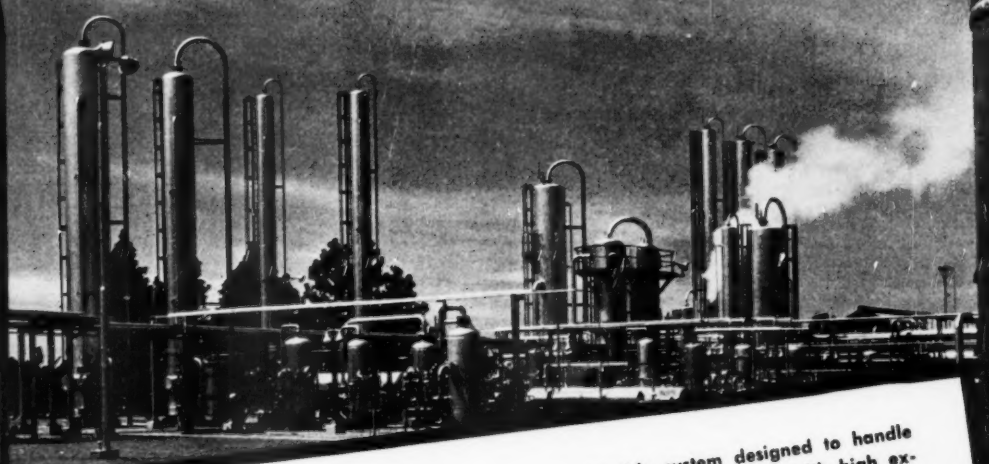
These air pressures become direct measurements and can be conducted to reading instruments or used as the measuring impulse for the actuation of an automatic controller.

For complete details write for Data Book No. 1001

REPUBLIC FLOW METERS CO.
2240 Diversey Parkway, Chicago 47, Illinois

The Record Of Progressive Technical Achievement

IT'S 4 in 1 AT SILSBEE



The new Silsbee (Texas Gulf Coast) plant of American Republics Corporation is an interesting example of the flexibility available in modern gasoline plant design. Field operations provide four separate gas sources which enter the system under extreme variation in pressures. Flare gas is received at 150 to 300 lbs., Gas-lift gas at 600 lbs., Pipe Line Sales gas at 900 lbs., and Cycling gas at 2200 lbs. The combined input is processed in a compact, flexible system designed to handle 75 million cubic feet daily with high extraction efficiency of propane in addition to butane, LPG, leaded and unleaded motor fuel, kerosene and absorption oil.

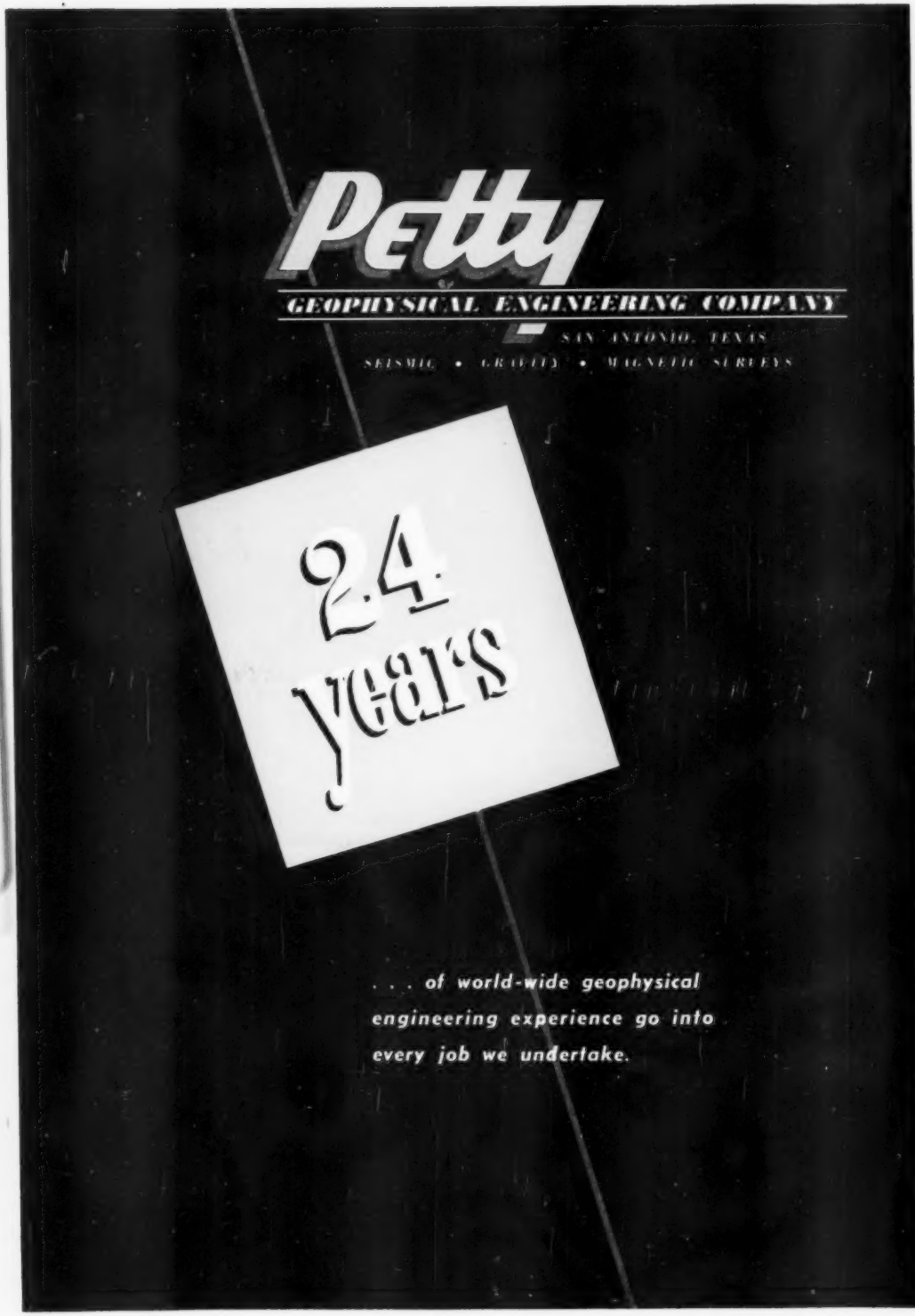
Silsbee is typical of the many distinctive gas processing plants designed and built by Gasoline Plant Construction Corporation in the Gulf Coast area, where we hold an enviable record for outstanding achievement in modern hydrocarbon processing.

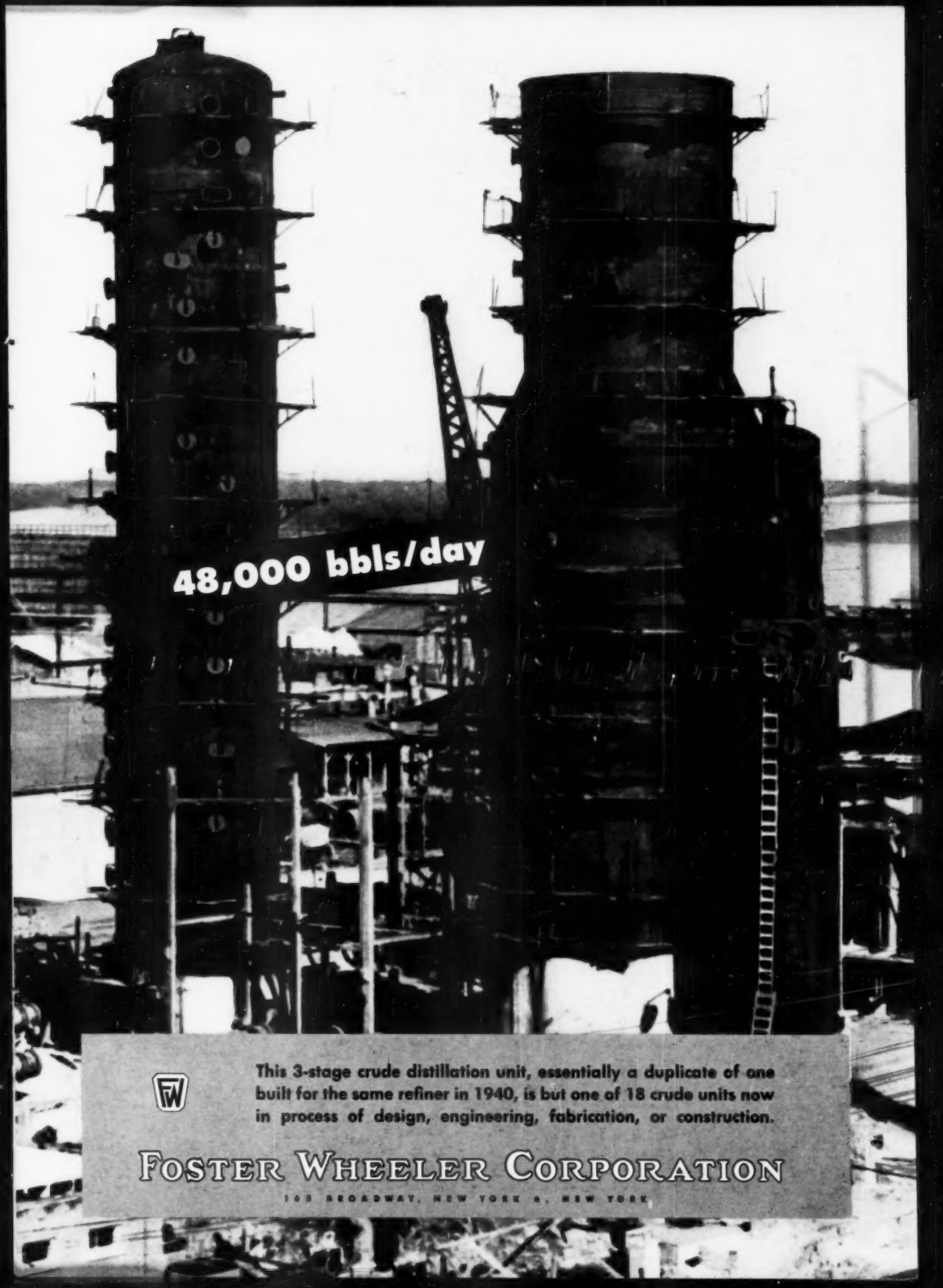
GASOLINE PLANT CONSTRUCTION CORP.

ENGINEERS . . . DESIGNERS . . . CONSTRUCTORS

NIELS ESPERSON BLDG., HOUSTON

NIXON BLDG., CORPUS CHRISTI


Petty
GEOPHYSICAL ENGINEERING COMPANY
SAN ANTONIO, TEXAS
SEISMIC • GRAVITY • MAGNETIC SURVEYS
24 years
. . . of world-wide geophysical engineering experience go into every job we undertake.

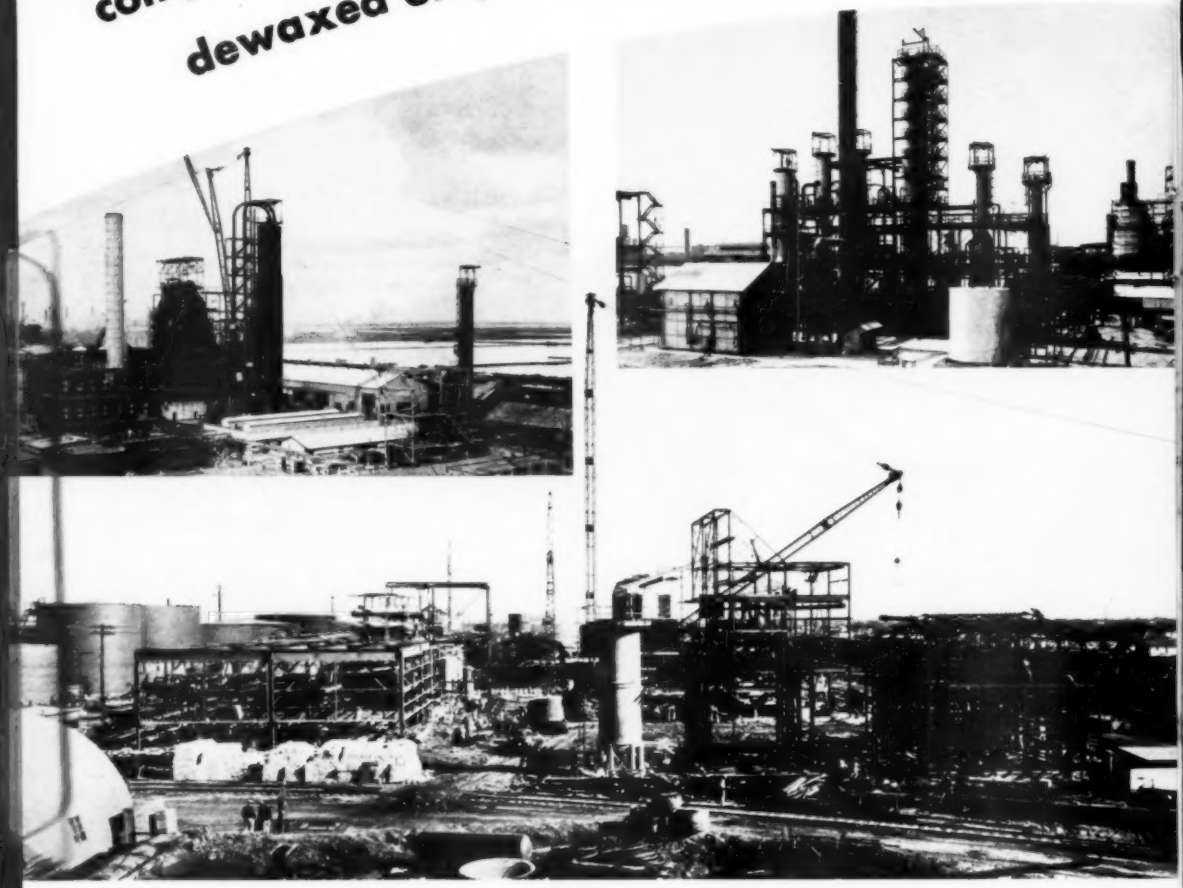


This 3-stage crude distillation unit, essentially a duplicate of one built for the same refiner in 1940, is but one of 18 crude units now in process of design, engineering, fabrication, or construction.

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK

complete lube oil plant
dewaxed oil production: 8000 bbls/day



Three major process units, all built by Foster Wheeler, are involved in the refining sequence of this complete Lube oil plant, viz:

Crude Distillation, 2-stage 40,000 bbls/day
(this is one of five for this same refiner);

Furfural Refining, charging capacity 5500 bbls/day;

MEK Benzol Solvent Dewaxing designed for a
maximum dewaxed oil production of 8000 bbls/day

When all three units are in operation, this combination will represent one of the largest Lube oil plants in the world.

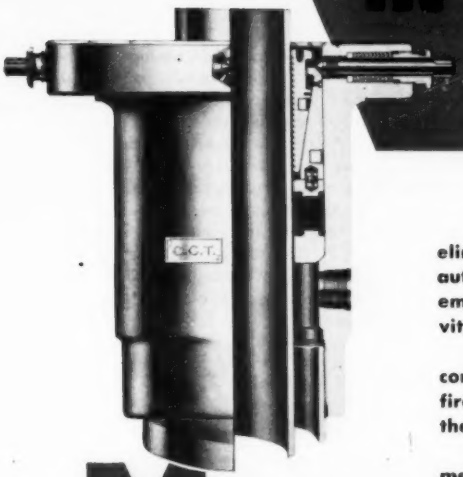
FW

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK

THIS MURRAY-MOLDED **O-C-T "C-19"**
CASING HEAD RUBBER RING . . .

MAINTAINED A SEAL IN THE FACE OF FIRE



Murray Rubber

The quick-setting O-C-T "C-19" Casing Head, which eliminates open hole hazards by effecting a positive seal automatically before blowout preventers are removed, employs a Murray-molded resilient Hycar seal ring at a vital point in its unitized suspension and seal design.

The heat-resistant quality of this Murray-molded rubber compound was clearly demonstrated when a well caught fire . . . from causes not connected with well heads . . . and the seal remained effective in the face of fire.

Murray . . . one of the nation's largest producers of mechanical rubber goods . . . provides complete engineering and machine shop facilities for the design and manufacture of customer's molds, dies and metal inserts to help you find the solutions to your rubber molding problems, both natural and synthetic. Write or call.

MURRAY RUBBER COMPANY
HOUSTON, TEXAS

MARMON-HERRINGTON

All · Wheel · Drive

Big Trucks—and Small for Every Oil-Field Call

In the Marmon-Herrington line you will find an *All-Wheel-Drive* truck—*with the right power, in the right capacity*—to fit your oil-field needs exactly, however big or small.

Marmon-Herrington offers twenty-two *All-Wheel-Drive* models in all. Four are heavy-duty models of the company's own manufacture; the balance are standard Ford models converted to *All-Wheel-Drive* by Marmon-Herrington. Wheelbases range from 110 inches to 220 inches—gross vehicle weights from 5,300 pounds to 42,000 pounds. There are 7 great engines, Diesel and gasoline—from 4 to 10 forward speeds, 1 to 4 reverse.

Live power and traction in all wheels—*front wheels pulling, rear wheels pushing*—give Marmon-Herringtons tremendous tractive power for toughest off-the-road operations . . . no mud too deep, no hill too steep, no going too rough and rugged. Let your Marmon-Herrington dealer give you an on-the-job demonstration of these great *All-Wheel-Drive* trucks. You'll witness an eye-opening brand of performance-ability.

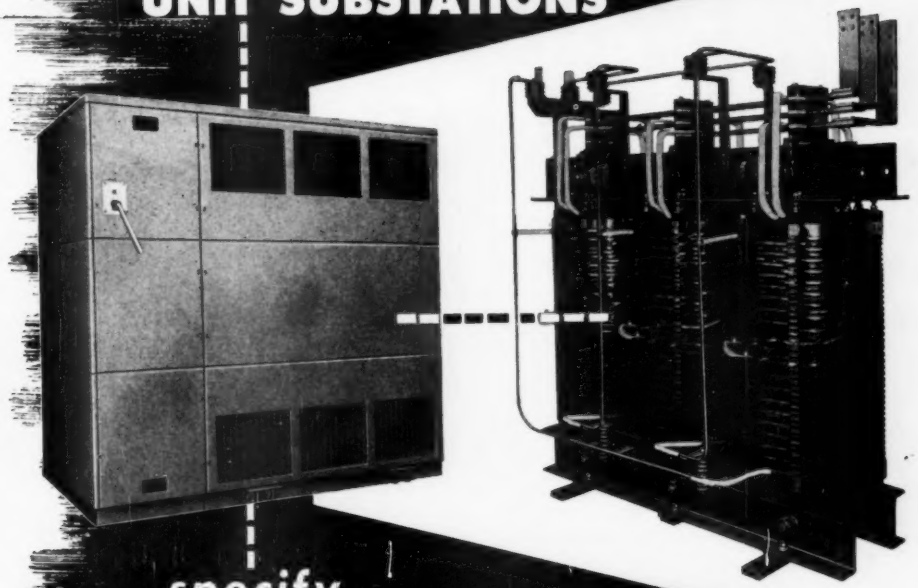
MARMON-HERRINGTON COMPANY, INC. • INDIANAPOLIS 7, INDIANA

MARMON-HERRINGTON

All · Wheel · Drive

when buying

UNIT SUBSTATIONS



specify

Wagner TRANSFORMERS

AVAILABLE IN RATINGS FROM 100 TO 2000 KVA

More than fifty years of transformer building experience has been incorporated in the design and construction of Wagner dry-type load-center transformers. Especially developed to meet industry's need for larger transformers for use in plant power distribution circuits, these units are compactly housed in neat, attractive enclosures, which can be arranged to include primary and secondary switchgear compartments to form readily accessible, closely-coupled unit substations. Complete enclosure of all equipment protects against accidental contact with live parts. Relatively light in weight, so they can be used in multi-story buildings, they are readily adaptable to any installation requirement.

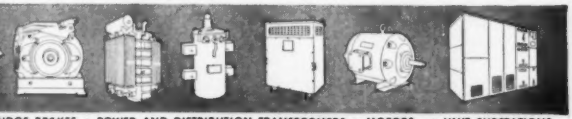
Bulletin TU-56 describes in detail the transformers, the enclosures, the various types of incoming line sections available, and the optional equipment and accessories that can be furnished. Write for your copy today.

Wagner Unit Substation Transformers are also available in oil-filled and Noflamol types. Bulletin TU-181 gives information on the complete line of Wagner Power Transformers.

Wagner Electric Corporation
6389 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U. S. A.

Consult Wagner Engineers on All Transformer Problems

Wagner Electric Corporation EST. WE 1891



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

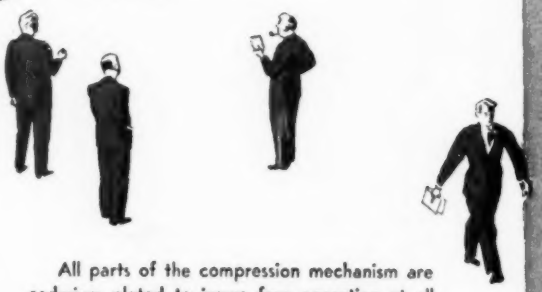
T49-3A

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

NEW! POSITIVE-SEAL

IN VOGT TWO-PASS SHELL HEAT

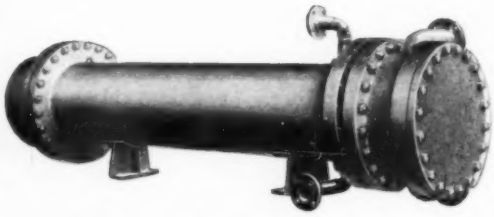
VOGT ENGINEERS SOLVE NUMBER ONE HEAT EXCHANGER PROBLEM



How to provide an absolutely tight seal for the longitudinal baffle in two-pass shell heat exchanger construction has long been the concern of heat transfer equipment builders but its attainment has eluded them until now. Today, the Vogt Positive-Seal Two-Pass Baffle described and illustrated here, operates with high efficiency in units serving many industries.

BAFFLE CONSTRUCTION

The baffle consists of a solid plate, inserted between the tube sheets of the tube bundle, having outwardly opening channels on each side. After inserting the tube bundle in the shell, there is loosely placed in each channel, and in the order named, a compression mechanism composed of a longitudinal series of pivotally connected steel links, a steel backing strip, and a suitable packing.



This two-pass shell Solution Cooler is equipped with the Vogt pivoted-link baffle sealing mechanism.

All parts of the compression mechanism are cadmium plated to insure free operation at all times.

SEALING THE BAFFLE

To seal the baffle, after the bundle is in position and prior to bolting on the cover of the unit, it is only necessary to turn the nut of the compression screw on the end of the compression linkage so that it bears against the locking washer. A stop in the other end of the baffle channel forces the adjacent end of the linkage, as well as the intermediate links, in a toggle-like action outwardly against the backing strip. Each link adjusts itself individually to transmit equal pressure along the length of the packing as it conforms to any unevenness of the shell. To remove the bundle from the shell, the seal is broken by backing off the compression nut whereby the linkage is retracted and pressure is removed from the packing.

Vogt Two-Pass Shell Exchangers are used in all services where overlapping temperatures ordinarily require two single pass shells.

HENRY VOGT MACHINE CO.

Louisville 10, Kentucky

BRANCH OFFICES:

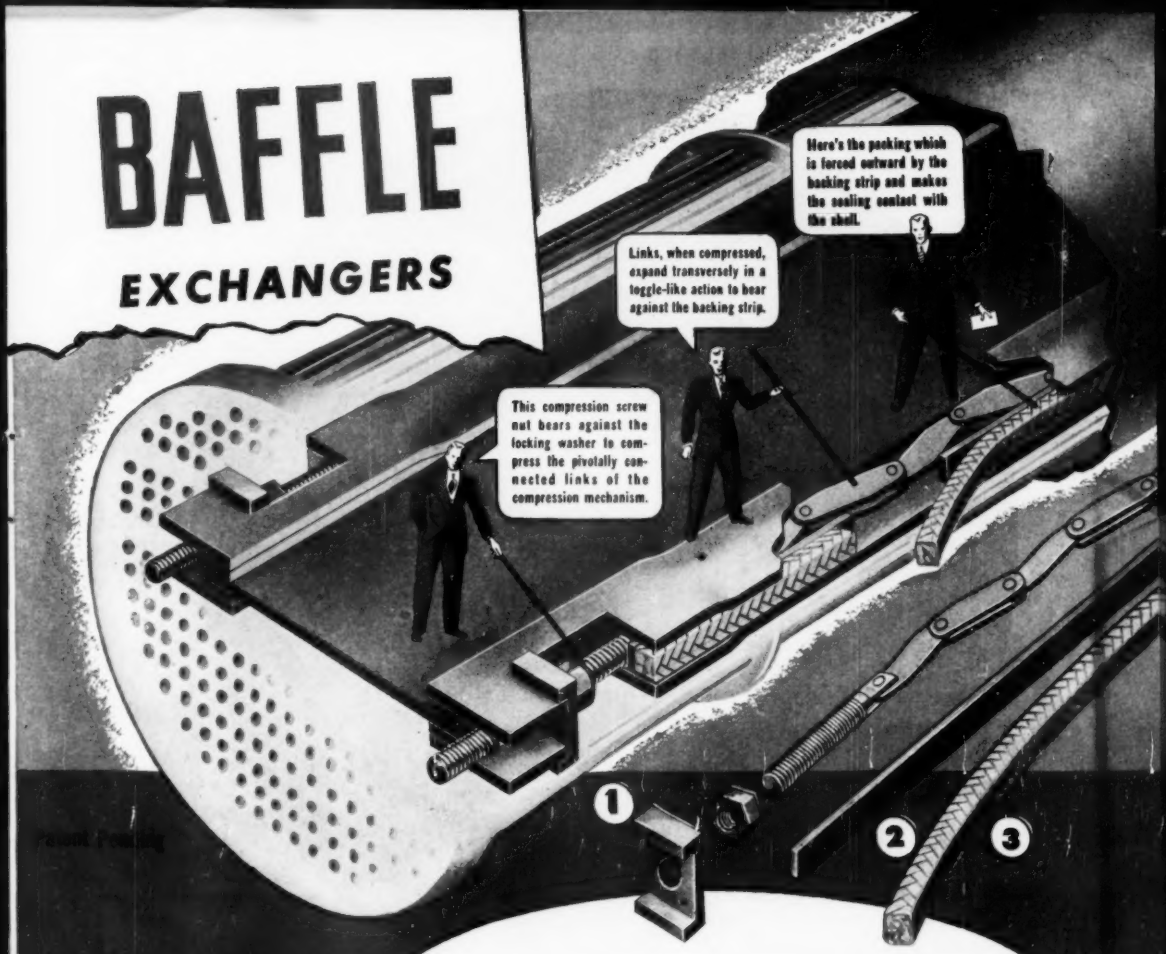
NEW YORK • PHILADELPHIA • CLEVELAND

CHICAGO • ST. LOUIS

DALLAS

BAFFLE

EXCHANGERS


Here's the packing which is forced outward by the backing strip and makes the sealing contact with the shell.
Links, when compressed, expand transversely in a toggle-like action to bear against the backing strip.
This compression screw nut bears against the locking washer to compress the pivotally connected links of the compression mechanism.
1
2
3

1 Exploded view of locking washer, compression nut, and screw attached to compression linkage.

2 Steel backing strip which equalizes pressure against packing.

3 Packing which makes the seal between baffle and shell.

Vogt

POSITIVE-SEAL 2 PASS

HEAT EXCHANGERS

Where have you seen THIS *face before?*

New fact-filled catalog will be sent to anyone requesting it on company letterhead.

It's the honest face of a good instrument—a familiar face because it has been widely chosen by oil men who know that the success of their equipment rests in no small part on the accuracy of its pressure indication.

Often that face is the face of a veteran—a Marsh Gauge that has seen many years of tough going. But, as you trace back over the Marsh Gauges you have known, can you recall a single one of them that has ever failed to do its job right?

To build such a gauge requires more than good design and construction. It requires a fund of practical knowledge that can be acquired only in the vast proving ground of the oil country—the kind of knowledge that Jas. P. Marsh Corporation has been accumulating for more than 80 years.

JAS. P. MARSH CORPORATION, Dept. L, Skokie, Illinois

THE MARSH BRANCH *plant at Houston offers shipment from stock and facilities for repairing all makes of gauges.*

MARSH GAUGES

SMOOTH RUNNING SHEAVES ... STATICALLY BALANCED

EASY TO HANDLE!

EXCLUSIVE DOUBLE ROW AMERICAN ROLLER BEARINGS

QUICK RIGGING! LIFT IN ONE PIECE BY ONE LINE ON END SPACER

PERFECT SHEAVE ALIGNMENT!

SIDE PLATES ARE ALLOY ROLLED STEEL

HOOK BOLTS MAKE HOLE ALIGNMENT EASY

BOTH THE CROWN AND TRAVELING BLOCKS HAVE:

BEARINGS that are really engineered for the job—exclusive double row sealed AMERICAN roller bearings having integral thrust shoulders, assuring perfect sheave alignment. ***SHEAVES*** are statically balanced, smooth running, large diameter—rope grooves are flame hardened for longer sheave and rope life. Grooved to A. P. I. Standards and can be welded and recut. Sheaves and bearings are INTERCHANGEABLE between mating Wheland Crown and Traveling Blocks. ***LUBRICATION*** is by conveniently located pressure grease fittings direct to inner race of each individual bearing.

ENGINEERED WITH A MINIMUM 4 TO 1 FACTOR OF SAFETY

WHELAND
CROWN *and* TRAVELING
BLOCKS
"THE BEST BUY IN BLOCKS"

A FAST FALLING BLOCK! NARROWER, SHORTER EASIER TO HANDLE! STABLE!

EASY TO REEVE!

FULLY STREAMLINED —NOTHING TO HANG UP...

STREAMLINED, COMPACT, STRONG, EASIER TO HANDLE

WHELAND CROWN BLOCKS, J-2500—250 Ton, J-3500—350 Ton—Fully streamlined heavy duty—light, compact, strong. Can be taken up in one piece on a single line over end spacer castings. Compact, will pass A. P. I. water table opening. Easy to anchor securely by hook bolts. Easy to line up with hole and keep lined up. Easy to reeve. Optional arrangements for cat line and sand line sheaves. Meets A. P. I. Specifications. Full mechanical details sent free on request.

WHELAND TRAVELING BLOCKS, K-600—60 Ton, K-1350—135 Ton, K-2500—250 Ton, K-3500—350 Ton—Fully streamlined heavy duty, fast falling—and unusually stable because of low center of gravity and smooth running large diameter sheaves. They are easy to handle, easy to reeve. The three piece guards are arranged for reeving cable without removal. However, each side guard may be readily swung out or removed for inspection or reeving. Heavy steel plate guards fully protect cable and prevent jumping from sheave grooves. Quick and full opening bottom bail—alloy steel forging.

These blocks meet the new A. P. I. Tentative Standards. A study of the many superior design and construction features will quickly show you why we say: "The Best Buy in Blocks."

Write Dept. O-5 *for Bulletins giving mechanical details. Free on request.*

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.

ROTARY DRILLING MACHINERY

DOMESTIC DISTRIBUTORS

Jones & Laughlin Supply Co.
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DRAW WORKS • SLUSH PUMPS • ROTARIES • SWIVELS • CROWN BLOCKS • TRAVELING BLOCKS

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BETTER SELECTION • QUICKER

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DELIVERY • NIGHT AND DAY

LAKE CHARLES CONROE ODESSA CORPUS CHRISTI

-WILDER

COMPANY

For Offshore Drilling . . .

PRECISION DIRECTIONAL CONTROL *at low cost*

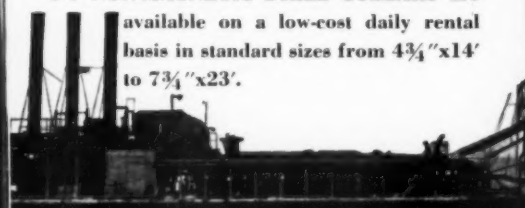
With Surveys Made Through S-S Non-Magnetic Drill Collar Rentals

Drilling multiple wells from restricted offshore platforms requires precision directional control. Here the S-S *Non-Magnetic Drill Collar* is proving more popular than ever. Frequent directional single shot records can be made inside the drill pipe . . . no need to remove the string from the hole or raise off bottom.

The S-S NON-MAGNETIC DRILL COLLAR is positioned immediately above the regular bit, the non-magnetic portion carrying the directional single shot instrument . . . fully protected from loss and damage.

Records are more accurate because the instrument is seated inside the drill collar in positive parallel to its wall.

S-S NON-MAGNETIC DRILL COLLARS are available on a low-cost daily rental basis in standard sizes from 4¾"x14' to 7¾"x23'.



LOW COST IN SURANCE FOR YOUR PROTECTION. For the nominal sum of $1.00 a day renters are insured in case of loss up to ½ current sale price and ½ of accrued rental at time of loss.

In addition to single shot records it is advisable on these high-cost operations to have a permanent photographic record of the inclination and direction of the holes available with Surwel (Gyroscopic) Multishot Surveying Service.

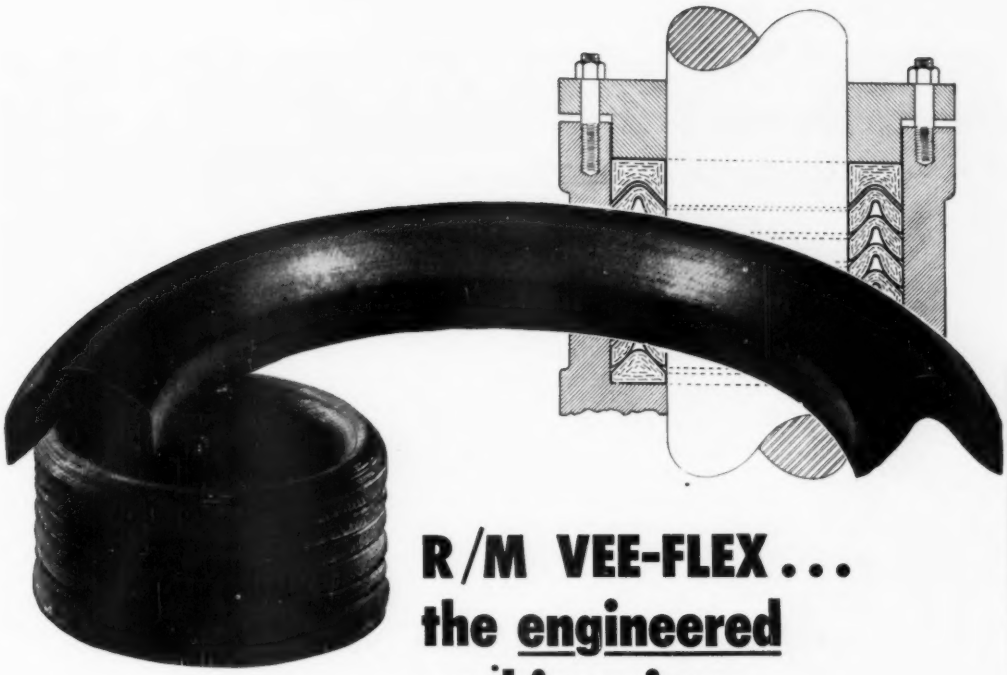
Ask us for complete information and price list on these two services.

SURWEL SERVICE ★SYFO CLINOGRAPH ★E-C INCLINOMETER ★NON-MAGNETIC DRILL COLLAR

SPERRY-SUN WELL SURVEYING COMPANY

3118 BLODGETT AVENUE HOUSTON, TEXAS

Philadelphia, Pa. Falfurrias, Texas Odessa, Texas Marshall, Texas Long Beach, Calif.
Oklahoma City, Okla. Lafayette, La. Bakersfield, Calif. Moulden Oil Field Services, Casper, Wyo.



R/M VEE-FLEX... the engineered packing ring

The R/M Vee-Flex packing ring is widely used for packing valves, pumps and hydraulic equipment in oil fields, pipe lines and refineries. It has been developed over a period of years by one of America's foremost manufacturers of packing and gasket materials. The ring is so designed that any increase in pressure spreads the lips of the ring outwards, and increases the efficiency of the seal against rod or stuffing box wall.

The combined skill and experience of four large R/M plants are drawn upon to produce these rings with a high degree of accuracy. Materials are carefully selected for long service, and are so combined as to give the special characteristics needed for use in water, oil, gasoline, mud, hot oil, sludge, and other fluids.

For full information, see your oil supply store or the authorized R/M packing distributor near you. Ask for the R/M Vee-Flex Bulletin and the R/M Packing Catalog.

RAYBESTOS-MANHATTAN, INC.

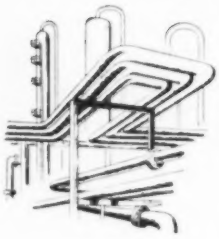
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Asbestos Textiles Mechanical Rubber Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts Radiator Hose • Powdered Metal Products • Bowling Balls

RM

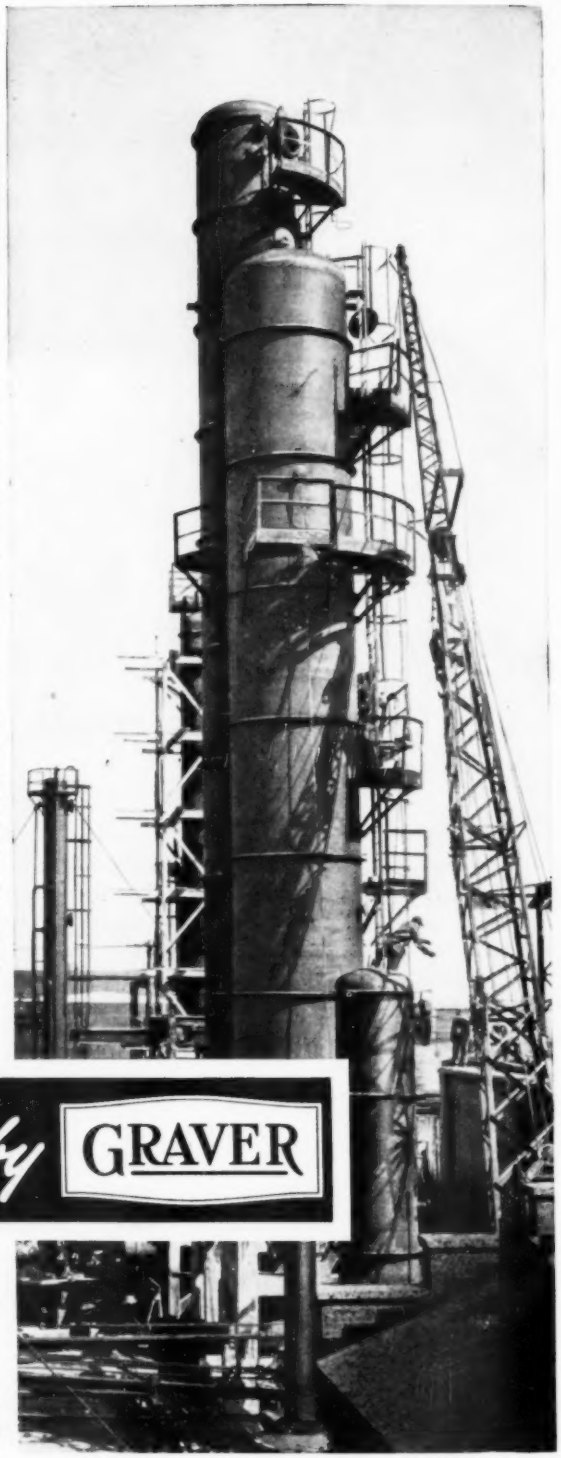
INCREASED PRODUCTION THROUGH PLANT EXPANSION



If plant expansion and modernization are necessary to boost your production, call Graver. This specialized division of the Graver company is geared to do the job . . . to serve the petroleum and process industries in all phases of engineering, procurement and erection of processing facilities.

Graver men and Graver equipment are available at strategic locations to bring the complete service to your construction project . . . whether it includes piping, masonry, equipment setting, electrical installations or erection of heavy vessels.

The facilities and experience of the Graver Construction Co. are available to you *now*. Write today for full information and quotations on your construction job.



Construction by GRAVER

GRAVER CONSTRUCTION CO.

A DIVISION OF

GRAVER TANK & MFG. CO., INC.

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ENGINEERING DEPT.: 880 BERGEN AVENUE, JERSEY CITY, NEW JERSEY

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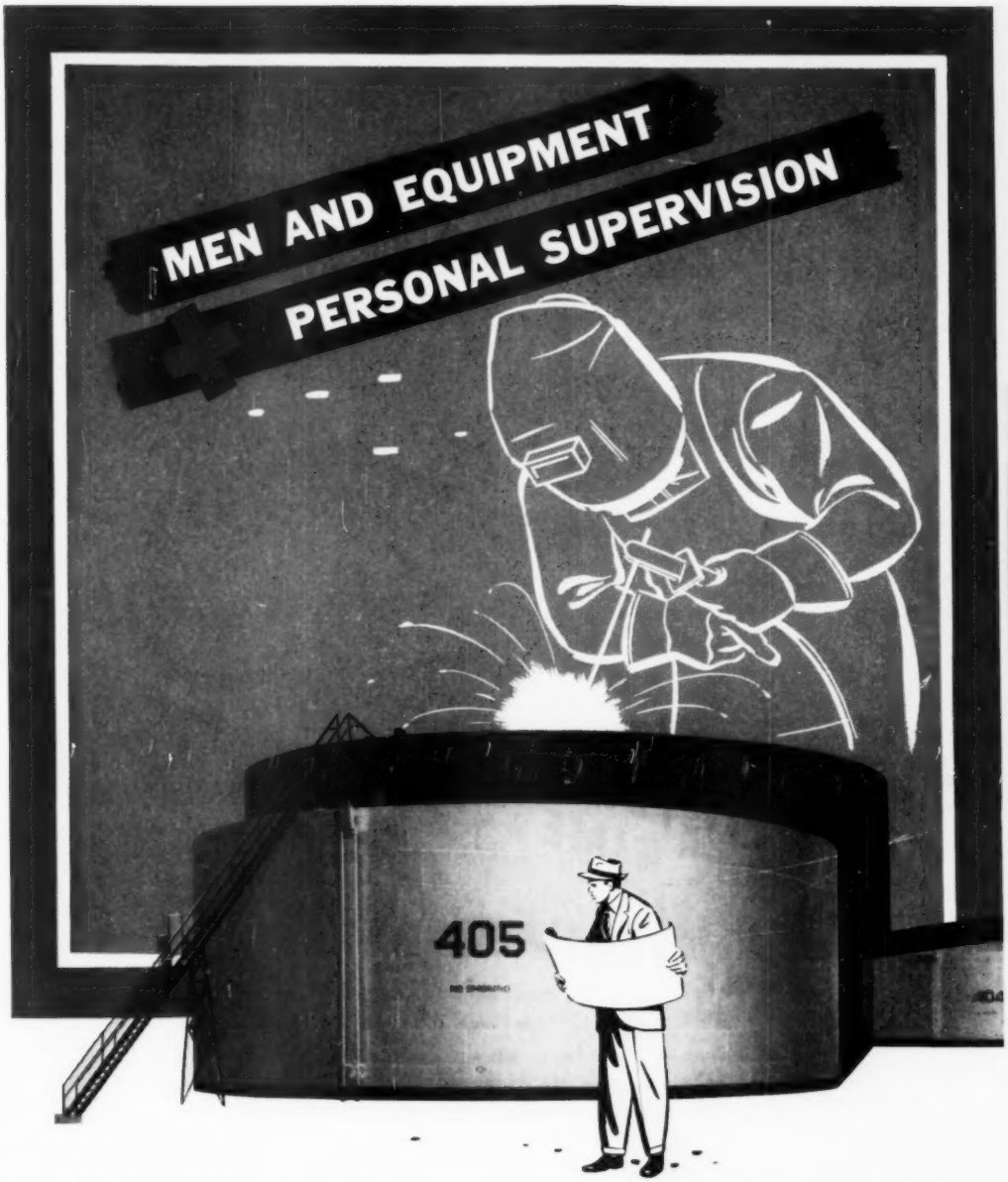
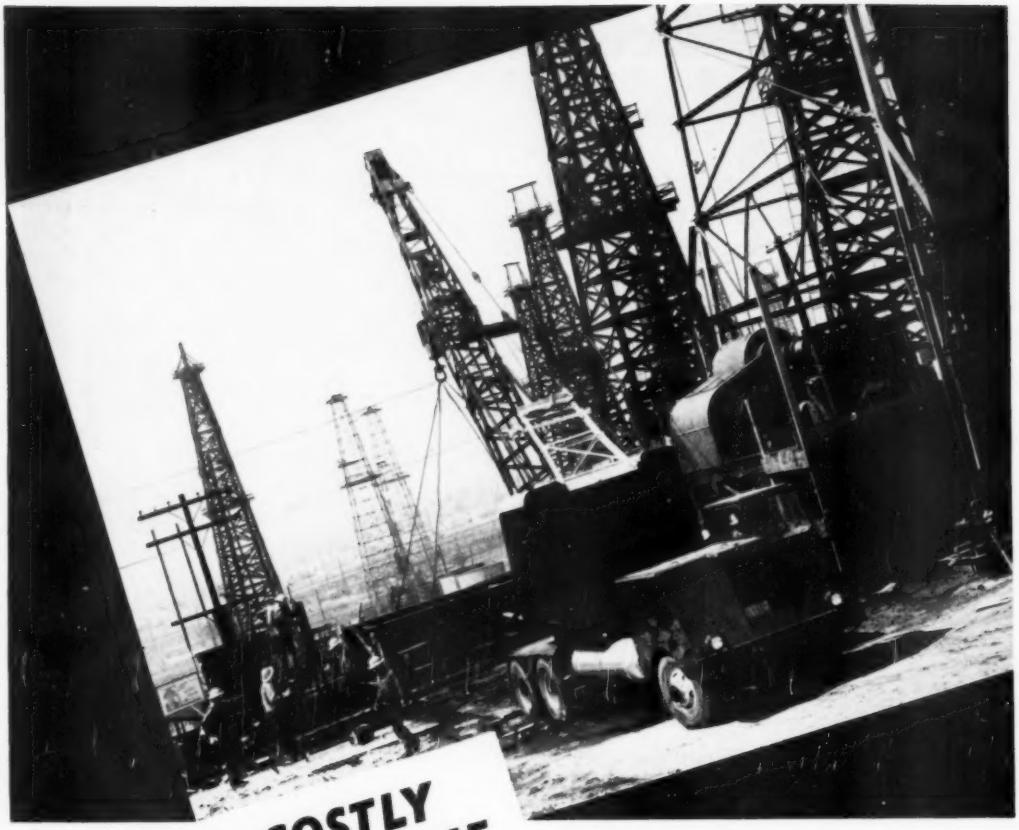


The combination of skilled workmen, modern equipment, adequate facilities and expert service PLUS the personal supervision of Sapulpa Tank engineers and officials assure economical tank jobs of higher quality.

Many years of tank service qualify Sapulpa Tank Company as experts in solving your tank construction and maintenance problems. Let a Sapulpa Tank representative aid you with your next tank requirements.

NEW TANKS
FIELD FABRICATION
TANK REPAIRING

SAPULPA TANK COMPANY
TANK CONTRACTORS
P. O. BOX 218 SAPULPA, OKLAHOMA
BRANCH OFFICE, FT. WORTH, TEXAS



CUT COSTLY "RIGGING" TIME WITH CRANEMOBILE

When rigging up or rigging down, time is important and that's where a BAY CITY CraneMobile, like this T-66 working for W. L. Kellogg & Son, at Signal Hill, California, can save real money. Fast and rugged—will handle heavy lifts and long pin-connected booms for high reach. It gets to the job quickly . . . and gets it done in a hurry . . . anywhere — anytime. Six-wheel drive with road speeds up to 30 M.P.H. Sound BAY CITY engineering plus rugged construction means minimum maintenance and readily accessible assemblies facilitate quick service. Dollar-for-Dollar, CraneMobile is a better buy. Write, wire, or phone today for complete facts on the BAY CITY T-66.

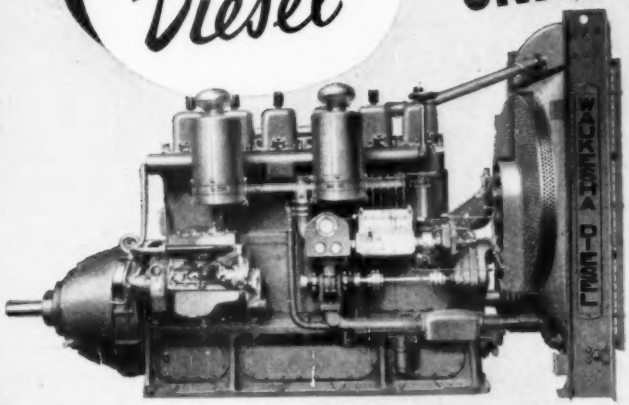
BAY CITY

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

BAY CITY SHOVELS INC., BAY CITY, MICHIGAN See your nearest Bay City dealer for excavating and material handling equipment in sizes from ⅜ to 1¼ yard with crane rating up to 20 tons. Both crawler and pneumatic tire mountings.

WAUKESHA

6-LRDU *Diesel* POWER UNIT



This one is for off-shore duty!

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.

Eastern Sales Office: Eight W. 40th St., New York 18, N. Y.
Mid-Continent Office: 703 S. Wheeling St., Tulsa 4, Okla.
Pacific Coast Office: 4927 Pacific Blvd., Los Angeles 11, Calif.

BULLETIN No. 1480

It's a new Diesel drilling unit—Waukesha's latest and largest, the 6-LRDU—and here's your copy of Bulletin 1480 to tell you all about it.

For off-shore drilling, where fuel economy, dependability and continuous operation is essential, this most modern Diesel drilling unit will pay production profits for you.

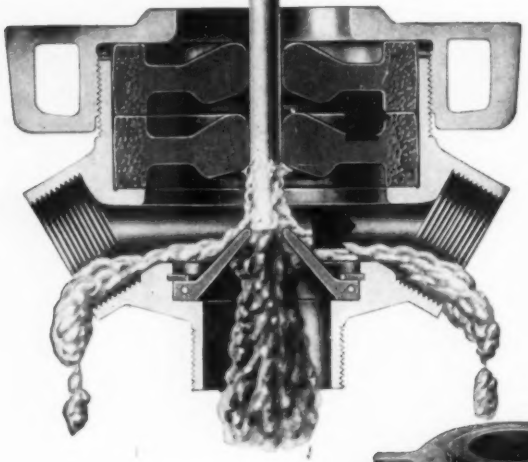
This heavy-duty unit has a vertical, six-cylinder, four-cycle, solid injection, compression ignition Diesel engine—8½-in. bore x 8½-in. stroke, 2894 cu. in. displacement. Most unique is the patented combustion chamber, which burns all standard "high-speed Diesel fuels" of 45 cetane and above. Within its rated load and speed range combustion is smooth and quiet. No shudder, no smoke.

The massive graphitic steel crankshaft has seven 5½-in. main bearings. Cylinder block is a single casting; wet sleeve cylinders are hardened to 400 Brinell. American Bosch injection! The large 4-cylinder cranking engine with its 20-30 hp. output, gives easy, speedy starting even in coldest weather. Find out about all the special characteristics of this Waukesha Diesel and its high fuel economy and low maintenance.

Ask for Bulletin No. 1480

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

the "New Look"



IN SUCKER ROD WIPERS

gives you a clean string of Rods

PATTERSON-BALLAGH SUCKER ROD PARAFFIN WIPER

CODE: *SUBAGENT*

(Specify Thread Connection Desired)

A "New Look" in Sucker Rod Wipers is more than just a change in appearance. It means that this model of the popular line of Patterson-Ballagh Sucker Rod Wipers has been improved to do a better job of stripping paraffin from rods, squares and couplings for you.

The main wiping rubbers are sealed in the body so that no oil leaks on the floor. The rubber grips the sucker rods in such a manner that the rods are wiped clean no matter how fast the string is pulled. They will seal against all but excessive gas pressures and will allow oil to flow to tank if the well makes a head.

Special spark proof lids for the Paraffin Wiper are available at a slightly higher cost. Install one of these Patterson-Ballagh Sucker Rod Paraffin Wipers on your rig today and give your rods a clean wipe the next time they are pulled.

RUBBER WIPING ELEMENTS

Code: *PRAETOR*

Code: *REFACE*

The two main D-25 rubber wiping elements, code: PRAETOR, have been strengthened to allow for expansions from ½" to 2⅛". Below these, is the cone-shaped rubber element, code: REFACE, which acts as a one way valve. This wiping element prevents the paraffin that has been stripped from the rods falling back into the hole.

PATTERSON-BALLAGH SEAL OF QUALITY OFF FIELD SPECIALTIES

Specify

PATTERSON-BALLAGH

DIVISION OF BYRON JACKSON CO.

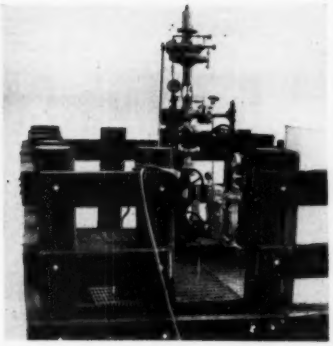
SUCKER ROD WIPERS

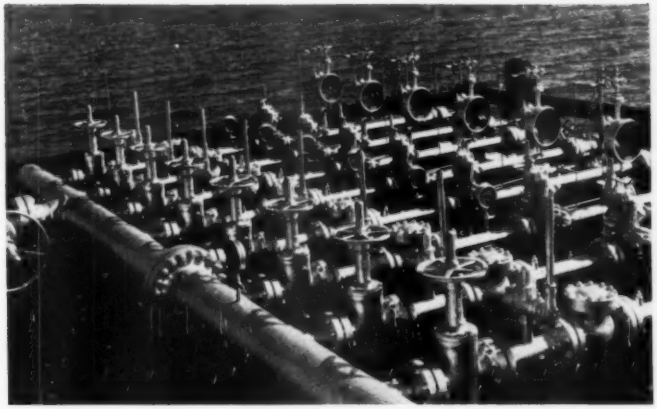
MAIN OFFICE: 1900 East 65th St., Los Angeles 1, California

6247 Navigation Blvd., Houston 11, Texas • 808 Graybar Bldg., New York 17, N. Y. • 330 Russ Bldg., San Francisco 4, Calif.

T.I.P.S.A., Santiago Del Estero 286, Buenos Aires, Argentina • A. R. Boyd, Edmonton, Alberta, Canada

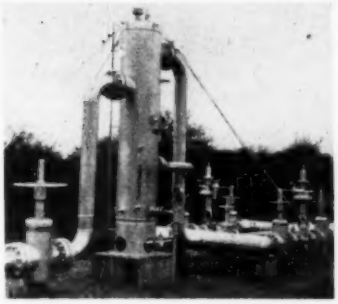
OFF-SHORE PRODUCTION AND GATHERING SYSTEM FOR NATURAL GAS





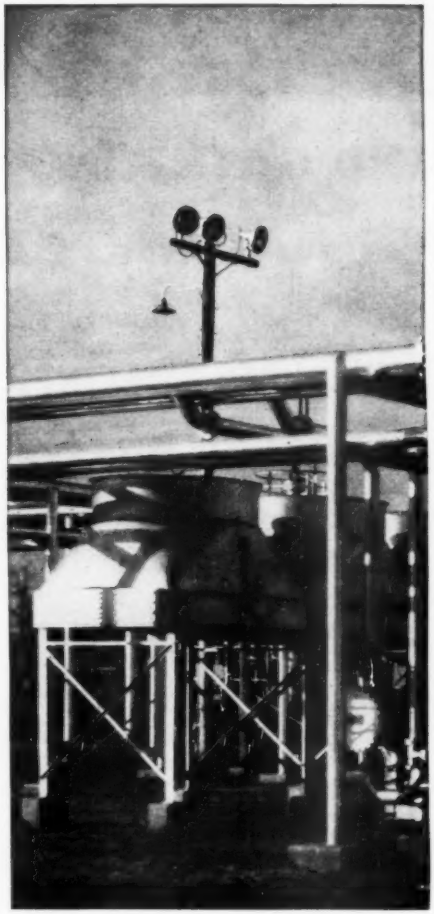
In the pictures:

1. A producing gas well, one of eight in this particular Marine project. MASONEILAN Regulators control the pressure from each well and will also automatically shut in wells if lines should break.
2. The Meter Station, at center of field 12 miles out in bay. 'MAINTENANCE' Meter Runs with COMMERCIAL Orifice Fittings and READING-PRATT & CADY Check Valves.
3. Control and Measurement Station on main line near plant site. Equipped with PEERLESS Separator, MASONEILAN Regulators and Meter Run by 'MAINTENANCE.'



This Texas Gulf Coast installation is furnishing gas to a major industrial plant. The offshore location offered unusual problems which were met by close cooperation by our engineers during the design, layout and installation of this system as well as during start-up period. In addition to the specialty equipment shown, system also includes NORDSTROM Plug Valves, EDWARD Meter and Gage Valves, VOGT Forged Steel Fittings and TUBE TURN Flanges and Welding Fittings—all stocked by 'MAINTENANCE' at Houston and Harvey, La.

6 Tough Cooling Duties in 1 Plant Handled by 1 Model ALCO Exchanger



The Skelly Oil Company gas plant at Velma, Oklahoma, built by the Born Engineering Company of Tulsa, presented a unique problem in certain process cooling requirements. Six different cooling jobs had to be handled in one battery, calling for different heat loads, temperature ranges and operating pressures.

One Alco air-cooled heat exchanger model (the uni-bundle*) was selected to handle all these cooling duties. The customer advises "Units are operating successfully at over design-capacity." A fine example of how Alco *standardized* air-cooled exchangers can be tailored to suit customer needs—simplifying operation, maintenance, replacement of parts. Alco's *standardized* models bring low cost per year of operation and multiple savings in upkeep costs.

*Trademark patented

ARE YOU FACED WITH ANY OF THESE COOLING PROBLEMS?

- Insufficient water supply
- Scale from bad or brackish water
- Expensive water treatment
- Difficult waste water disposal
- High pumping costs
- High relative humidity
- Excessive space requirements for cooling basins

THEY CAN BE SOLVED INEXPENSIVELY BY ALCO AIR-COOLED EXCHANGERS

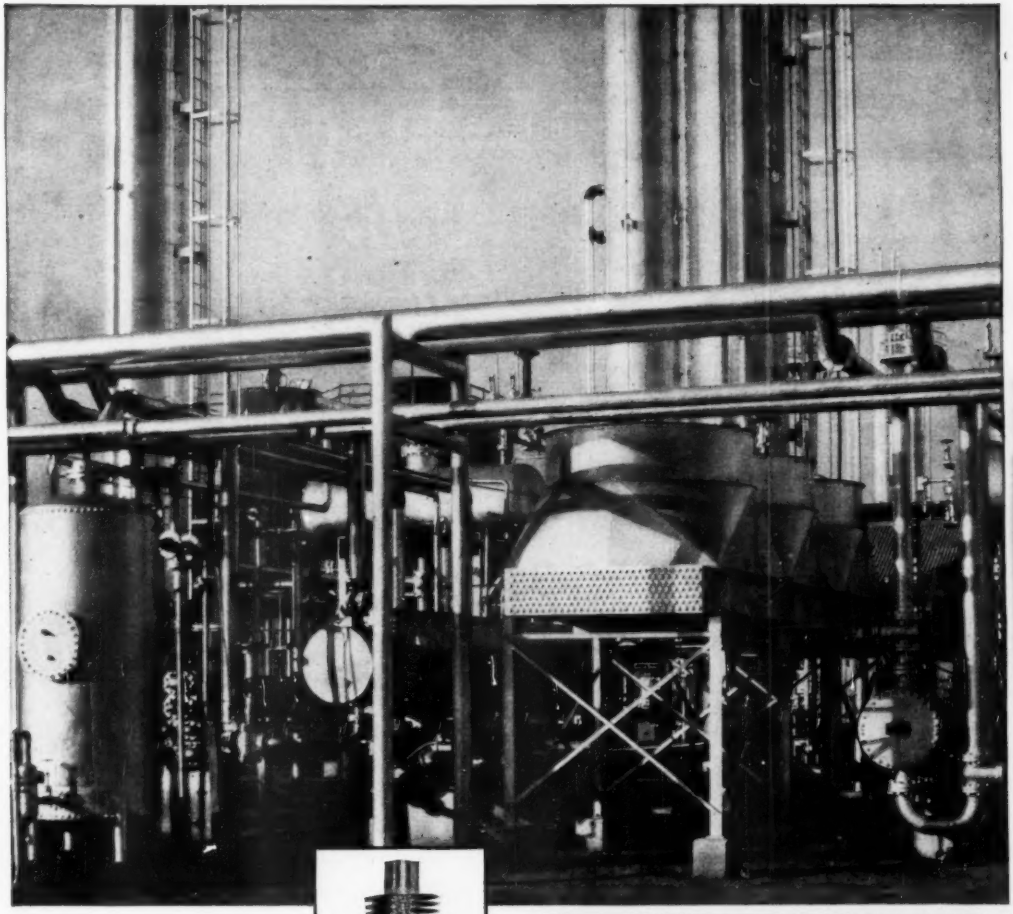
Proved in use in many of the nation's largest gas plants, in pump line stations, in power stations, in diesel locomotives—in many varied applications—Alco exchangers may be the answer to your specific problem.

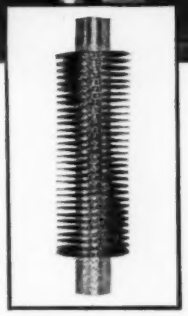
ADVANTAGES OF ALCO DESIGN

1. Volume production means standardized parts, easy maintenance, low cost per year of operation.
2. Simple field installation of standardized components.
3. Fans may be driven by any form of power.
4. Natural draft construction increases efficiency, reduces power requirements. Sometimes this natural draft is sufficient to produce adequate cooling without use of fans.
5. Wind direction and velocity do not affect efficiency.
6. Cooling surfaces positioned to minimize damage from wind-driven sand, rain, hail.
7. Induced draft insures uniform distribution of air across cooling surfaces.

FIN-TUBE MODELS CAN PERFORM MULTIPLE DUTIES

Selection of type of cooling surface to be used should be determined by economics and process requirements. As manufacturers of both radiator core and fin-tube types, and also as one of the world's largest makers of heat exchangers, Alco is in a position to give impartial advice.





Quality controls of Alco fin-tube manufacture assure highest heat dissipation rate. Fins wound on under pressure and permanently bonded on tube by means of solder bath completely covering fin and tube. Easy to handle, easy to clean with compressed air.

ADDITIONAL ADVANTAGES OF FIN-TUBE MODEL

1. Separate surfaces for separate cooling duties can be mounted in the same unit.
2. Header design permits variation of passes to suit process requirements of a given job, thus allowing selection of minimum surface within pressure drop limitation of the process while maintaining maximum velocity required for highest rate of heat transfer.
3. Orifices built into manifold-header design assure uniform distribution to entire cooling surface.
4. Bundle design of Alco fin-tube construction eliminates air leaks.

WRITE FOR FREE BOOKLET, just off the press, containing engineering, design, and selection data on Alco air-cooled heat exchangers. Learn how Alco can help you.

ALCO

AMERICAN LOCOMOTIVE

HEAT EXCHANGER HEADQUARTERS

Dunkirk, N. Y. Beaumont, Texas

AMERICAN LOCOMOTIVE CO., Dept. H, Dunkirk, N. Y.

Gentlemen:

☐ Please send me your Free new booklet on air-cooled heat exchangers.

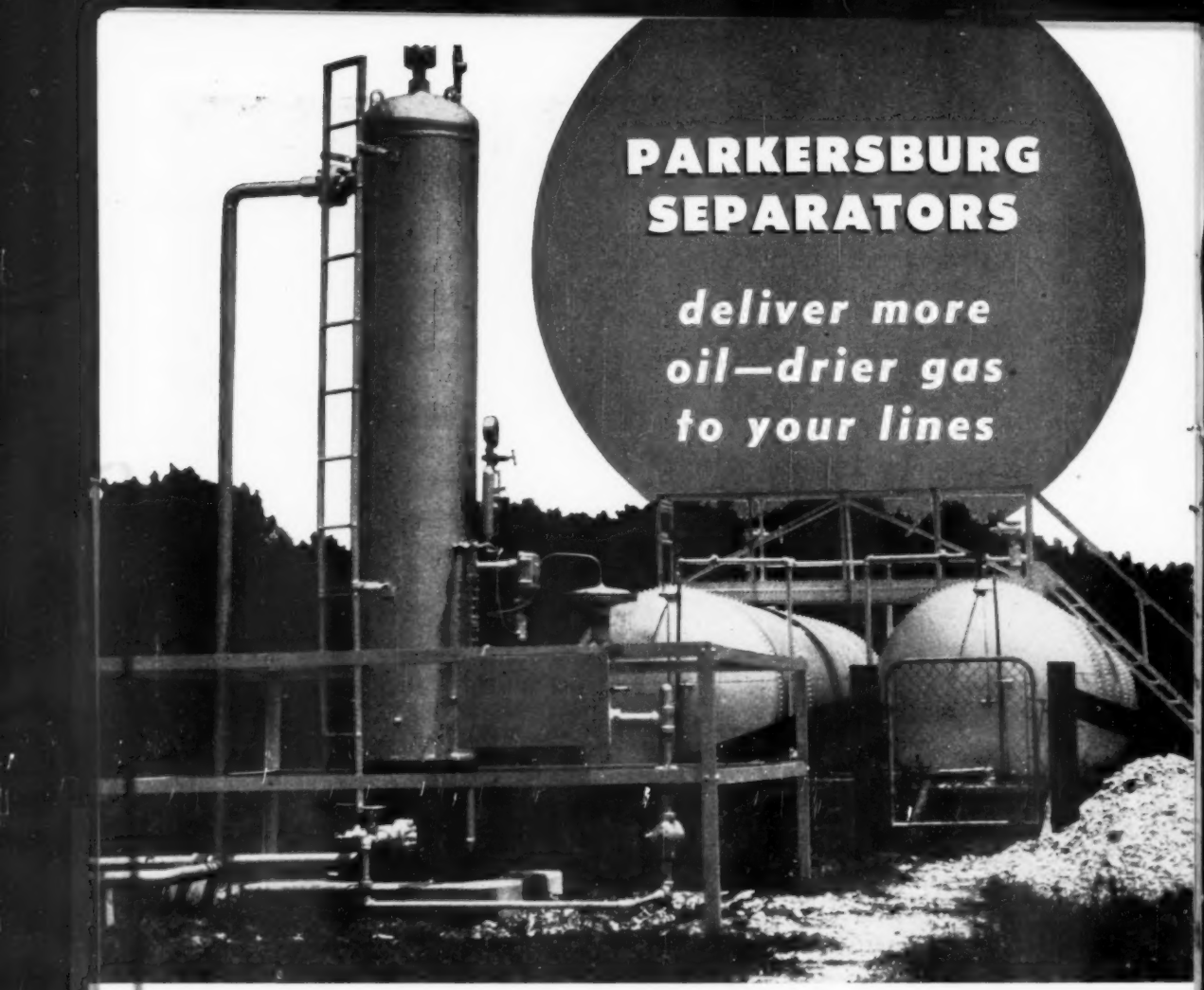
☐ Have an Alco representative call, at no obligation to me.

Name .....

Company .....

Title .....

Address .....



It's what comes out of your separator that's important. That is why Parkersburg Separators are first choice. Operators want the greater volume of oil and drier gas which can only be obtained by Parkersburg's triple separating action. Comparative tests prove it!

1. Centrifugal action of the fluid and gas from the time it enters the separator until discharged maintains a continuous separating process.
2. Contraction and expansion of the gas due to increasing and decreasing velocity constantly removes moisture from the gas as it passes through the specially designed baffle plates and vanes.
3. Impingement or wiping effect of the gas on the surface of the interior parts as it passes through the separator further removes moisture from the gas.

Thus, fluid and gas is in a constant state of separation as it moves through the separator. With such effective and continuous separating action, there can be no doubt as to why Parkersburg Separators deliver more oil and drier gas to your lines.

Ask your nearest Parkersburg Representative for complete facts about Parkersburg Separators before you install your next separator.

THE PARKERSBURG RIG & REEL CO.
PARKERSBURG, WEST VIRGINIA

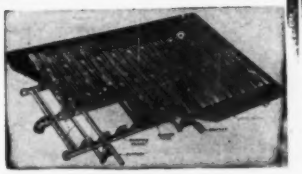
PARKERSBURG

HENRY H. PARIS DISTRIBUTOR Inc.

Manufacturer's Agent - Oil Well and Refinery Supplies

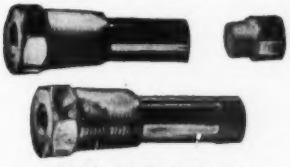
P. O. BOX 932 — 1125 ROTHWELL ST.

HOUSTON, TEXAS



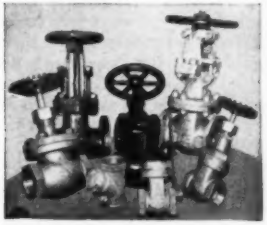
Volcano Superior Gas Burners

These burners derive their higher efficiency and longer life from such features as: All-steel construction; Burner heads with double barrel shank and double mixer are equivalent to two ordinary burner heads; Slight H-shape of head assures more perfect combustion by proper circulation of secondary air; series of heads on triple manifold covers approximately entire firebox area. For superior efficiency, specify Volcano Superior Gas Burners.



OSECO High Pressure Fusible Plugs

Unique design permits replacement of inserts instead of the entire plug. OSECO "Silver Top" plugs are made in all standard sizes of best quality bronze, under A.S.M.E. specifications, for 300 and 350 lb. oil field boilers. They can also be furnished in Monel or Stainless Steel.



O.I.C. VALVES

OIC Valves give you all of these benefits: Longer uninterrupted service; Lower maintenance replacement costs; Minimum over-all cost. They've been doing it for users everywhere, as impressive performance records attest. OIC valves are backed by more than 57 years of engineering skill, manufacturing integrity and outstanding valve performance. In OIC's you get all the benefits that it is possible for valves to render.

Agent and Distributor for the following Nationally known Manufacturers

★

W. C. NORRIS MANUFACTURER, INC.
Tulsa, Oklahoma
Quality Pumping Equipment, Swage Nipples, Bull Plugs, Welding Fittings, etc.

★

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS. Gas-Water-Steam.

★

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC VALVES, Bronze, Iron and Steel, for all purposes. "Oh! I see Lower Costs with OIC."

★

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

★

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

★

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

★

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

★

FLEETLINE
Forged Steel Welding
PIPE SADDLES

Fleetline saddles fit the contour of the pipe . . . have correct wall thickness. They weld neatly into place with much less time and welding rod. Fleetline Saddles are made from welding grade, seamless steel of proper chemical and physical analyses. They do a better, safer, more permanent job at less cost.

Norris Quality Products

W. C. Norris swaged nipples, bull plugs, stuffing boxes, sucker rods, polished rods, welding caps and other equipment are backed by 63 years manufacturing experience, assuring the user highest quality for the utmost in efficient performance and service at no increase in cost.

Harrisburg Forged Steel Flanges - Seamless Pipe Couplings

Harrisburg Drop-Forged Steel Pipe Flanges meet every test of strength and safety. Their unvarying uniformity merits your consideration wherever quality is essential. Made to ASA standards.

Harrisburg Forged Seamless Steel Pipe Couplings are uniform in strength and quality. Threads will not strip under most severe strain. Manufactured to API specifications.

90 DEG. DRESSER ELLS

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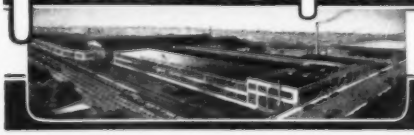

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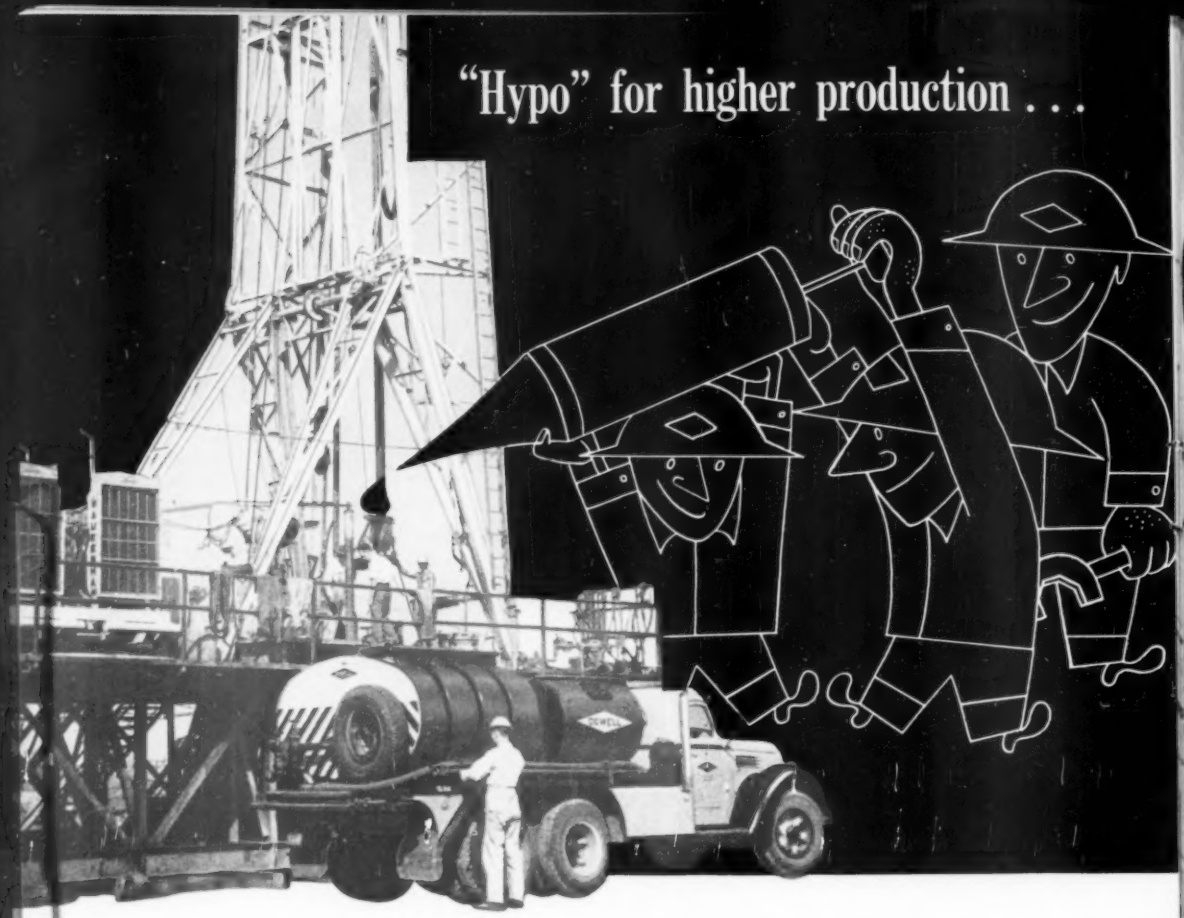

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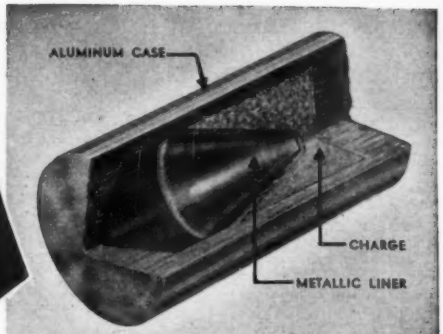
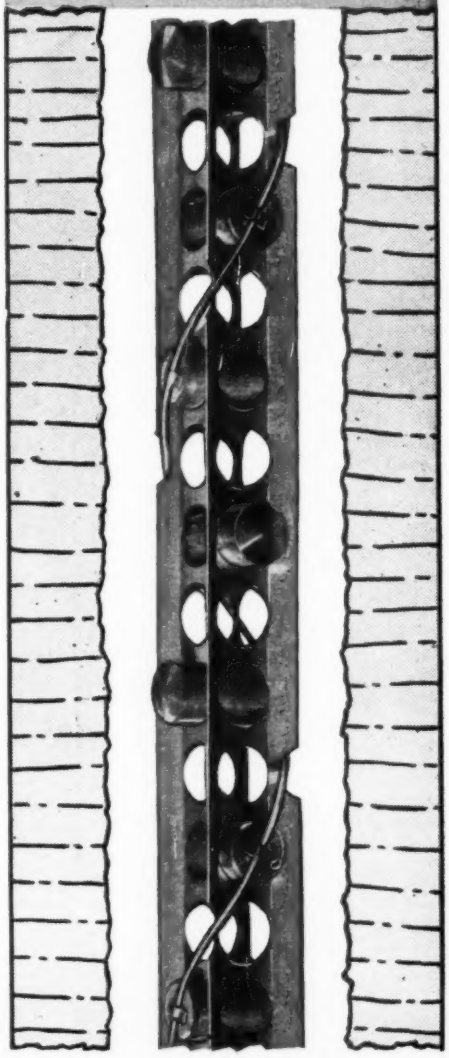
WELEX now introduces TORPEDO JET



ABOVE: a cut-away view of the Welex Torpedo-Jet charge.

BELOW: a section of the aluminum carrier containing the Torpedo-Jet charges.



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JOURNALLY Speaking

Big Gulf

THIS special Gulf Coast issue is big—one of the biggest the Journal ever printed — because the Gulf Coast is big—oilwise as well as geographically.

They—meaning both the issue and the coast—take in a broad sweep of important oil territory of our five southernmost states from the Everglades to the Rio Grande. This issue is a new high in editorial coverage, too. Planning started months ago, and our editors have covered a lot of territory in person and by wire. More articles than ever are included, and they treat uniformly with important developments in drilling, production, gas processing of all kinds, refining and pipeline developments, and offshore activities.

It's designed as a reference work, and we suggest you keep it around for that purpose.

Pike's Peak or Bust

THERE'S a group in the Interstate Oil Compact Commission which feels that the meetings should be confined to the business and problems of state regulatory bodies and should have less of the aspects of a convention or a junket. This feeling seemed to be making a little headway at the Jacksonville meeting until the State of Colorado invited the Compact to meet in Estes Park September 1-3. The invitation was accepted without a dissenting voice.

Sunk Without a Trace

RESIDENTS of Los Angeles who blame the sinking of Terminal Island on extraction of the oil beneath it may get some sympathy—but not much help—from the story on page 352 of this issue which relates the strange case of the disappearance of an oil field in Texas 20 years ago.

Without warning, a 15-acre plot of Sour Lake field sank 100 ft. or more within a period of a few weeks, and the spot has been a lake ever since. The mystery was never solved, though there were many theories as to the cause. Most people believed the sinking was in some way connected with the oil operations, but just how has never been determined.

Full Cycle

HISTORY seems to be repeating itself. Speakers at the New Orleans meeting of Independent Petroleum Association of America recalled that the organization came into being to fight imports of foreign oil and that issue is again the primary one before it. And the following week the Interstate Oil Compact Commission was told that its present duty is to prevent waste which comes from producing oil in excess of market demand, which was the problem that brought the regulatory bodies into a compact in the first place.

For Value Received

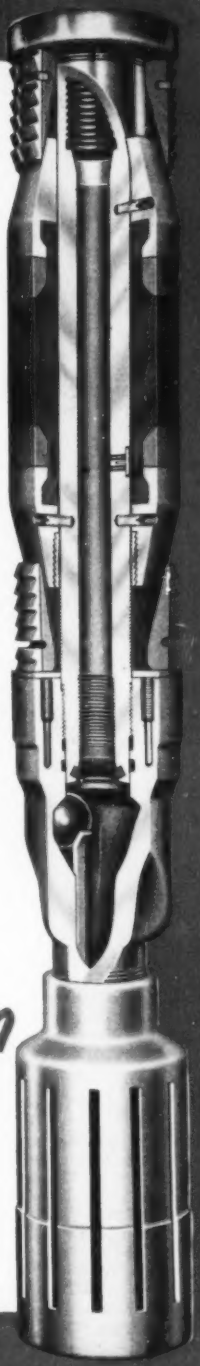
NICE work, if you can get it, is the job of past president of the Independent Petroleum Association of America, as Merle Becker discovered at the recent New Orleans meeting when he was presented with a Cadillac. His predecessors have all been given expensive cars or oil portraits, paid for by popular subscription among the membership, so this just carries on the tradition. But it's a wonder they didn't give Merle a Rolls Royce which might be better adapted to the British gasoline which I.P.A.A. fears is soon to flood the American market.

Epigrammatic

OUR biggest natural resource is our natural resourcefulness, says Wallace Pratt, dean of geologists, in explaining that we have more oil production than any other country not because we have more sedimentary rocks but because our economic system encourages exploration. That's the secret of the American oil industry in an epigram.

—Henry D. Ralph

why are more and more Baker Cement Retainers being made of magnesium?



That's a fair question and here's the answer:

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All major parts of this retainer are made of ***magnesium*** except the annularly segmented nitricastiron slips, which readily break into small pieces when drilling out.

The special ***magnesium*** alloy employed has *ample strength* for all types of *remedial or secondary* cementing, and is well suited for use as a *temporary* bridge plug to prevent movement of liquid or gas up or down the hole. For a *permanent* bridge plug, use the Baker **Cast Iron** Cement Retainer, as certain well fluids ultimately produce a chemical reaction on the ***magnesium.***

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Use as a WIRE LINE Bridge Plug

A successful method recently has been developed for setting the Baker Model "K" Retainer Bridge Plug when run on a wire line. The savings in running time, savings of wear and tear on drill pipe or tubing, and other worthwhile advantages, merit your consideration of the "Baker Wire Line Bridge Plug" as it is popularly referred to in the field. Any Baker representative or office will furnish the names of service organizations ready to assist you.

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THE OIL AND GAS JOURNAL

Normalcy on Gulf Coast

WHEN the records were checked in late 1945 it was readily apparent that Gulf Coast operations had in large measure filled the gap between the peacetime requirements of the pre-1942 period and the greatly increased oil needs of the war. The area had quickly adjusted its operations to the wartime program of maximum expansion.

It was assumed by many that the return of normalcy after the war's end would mean the folding up of many of the 1942-1945 petroleum activities and a curtailment in others. The opposite is true. As revealed in this Annual Gulf Coast issue, the area's accomplishments over the past 3½ years in supplying a large part of the phenomenal gains in postwar petroleum consumption have been as outstanding as was the war record.

By utilizing all the old and new tools of exploration, some of which had their first application in the area, the Gulf Coast has maintained its lead position in proven oil and gas reserves The rapid growth in Texas-Louisiana natural-gas activities attests to the ingenuity of operators in not only finding gas reserves but also in devising means to dispose of them in distant markets to the east and north. These projects have been tied in with the application of conservation principles in the recovery of light fractions in oil and condensate fields and the disposal of the dry gas.

The home of the widest application of deep drilling, new equipment, and new techniques in the Gulf Coast over the past year have increased efficiency and safety so that the search for oil is now feasible at depths up to 20,000 ft. Improvements in pumping, pressure maintenance, and other production practices have added greatly to the recoverable oil.

For many years the world's largest refining center, the output of the Gulf Coast's plants continues to expand with a large construction program under way at this time. The petrochemical industry, which started from war needs, has expanded in several directions, with still greater accomplishments in the offing. The Gulf Coast oil industry was founded on market outlets along the Atlantic seaboard and many foreign countries. Now large quantities of products also move north and east by pipe line and the Mississippi River and its tributaries.

Finally there are the tidelands, which have brought more that is new in exploration, drilling, producing, and transportation practices than any development in many years. It has been necessary in effect to establish an entirely new type of oil operations.

It should now be apparent that the determination of the tidelands oil possibilities involves prolonged exploration and development at high costs. This can only be accomplished by private operators who must have the assurance of complete understanding by government of the many special problems involved. National security as well as the rights of the operators demand a quick settlement of the ownership issues now pending.

Huge Gas Pipe Line Proposed to Run From Alberta to California

CONSTRUCTION of a pipe line to take natural gas from Alberta, Canada, west to the Pacific Coast and south through Washington and Oregon into northern California is being planned by Pacific Petroleums, Ltd., of Canada, and associated interests.

Present plans call for a line 30 in. in diameter and 1,400 miles long, which would make it the largest gas line and one of the biggest and longest pipe lines of any kind in the world.

The line would originate in the northern part of the Province of Alberta, run west and south through passes of the Canadian Rockies to Vancouver, B. C., and then south parallel to the Pacific Coast of the United States. It is estimated to cost $175,000,000.

Open to Others

Announcement of initiation of the project was made in New York by Frank McMahon, president of Pacific Petroleums, Ltd. Associated in the project are Sunray Oil Corp., Tulsa, and the New York investment banking firm of Eastman, Dillon & Co. Sunray is a substantial stockholder in Pacific Petroleums, and both these firms have large interests in Bear Oil Co., Ltd., which has gas reserves in Alberta. The announcement indicated that other gas producers in Alberta might also participate in the project.

A new firm, Westcoast Transmission Co., Ltd., has been formed in Canada to construct and operate the Canadian portion of the line. It is understood, however, that the company has not yet obtained authorization from the Canadian Government to construct the line and export gas. The announcement stated that an American corporation probably will be formed later to construct and operate the American portion of the line, and that this company would apply to the Federal Power Commission for a construction certificate.

Reserves Plentiful

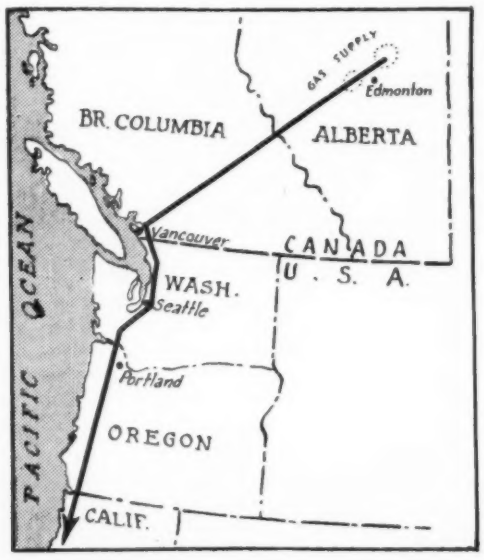
"Since the war," McMahon's announcement said, "the existence in the Province of Alberta of large quantities of natural gas has been confirmed by extensive geological and exploratory work and the bringing in of gas wells of high potentials on locations scattered over a widespread area. However, it has heretofore not been clear just how the newly discovered gas would be marketed, since Canada itself is presently incapable of consuming more than a small part of the indicated potential delivery capacity of the proven and semiproven reserves.

"With the construction of the projected pipe line to the Pacific Northwest and northern California, a solution to this problem will have been found, as marketing surveys have indicated a demand in that region upon completion of construction of approximately 500,000,000 cu. ft. daily with the probability of a considerable subsequent increase in demand over the years eventually requiring construction of a duplicate line.

"Well-known natural-gas engineers and consultants have stated that in their opinion, based on preliminary surveys, the gas reserves that will be available to the pipe line upon further development will be ample to support delivery at the required rate for a long period of years.

"Numerous American and Canadian oil and gas companies own leases and concessions throughout the tributary areas in which the gas-bearing sands lie. Among the companies which will be benefited by the new pipe line are Sunray Oil Corp. and Pacific Petroleums, Ltd., which not only have extensive interests in oil and gas fields in Alberta and British Columbia, but are also among the organizers and future owners of the pipe line.

"It is the intention to begin the pipe line in an area within Alberta lying to the north of Edmonton, where today extensive gas reserves are being established incidental to the present intensive search for oil. In this area numerous companies, both Canadian and American, will share in the sale of this gas. The proposed route of the pipe line passes through an area to the west on the Alberta and British Columbia border in which a number of gas wells have been brought in indicating the presence of a large amount of gas. In this area Sunray Oil Corp. has a 50 per cent interest, the balance being controlled by Pacific Petroleums, Ltd."



Map showing the route of the proposed 1,400-mile gas pipe line

Texas, Louisiana Will Face Tidelands Suits

WASHINGTON. — The Department of Justice this week won its fight to sue the states of Texas and Louisiana for their tidelands.

The Supreme Court issued an order May 16 giving the department premission to bring original suits and ordered the states to file their answers to the Government's complaints by next September 1.

The court's action followed the hearings of arguments a week earlier at which officials of the two states opposed the department's petition, Louisina on the ground that it was a sovereign state which could not be sued without its permission, which it had not given, and Texas on the ground the matter was one on which Congress should act before it got into the courts.

Texas University Leases Bring Bids of $1,508,000

AUSTIN. — Offerings of mineral leases on 41,000 acres of University of Texas lands in West Texas brought bids totaling $1,508,000 here May 13.

Highest bid was the $280,000 offer of The Texas Co. for a 2,560-acre drilling block in Andrews and Martin counties. Second-highest bid was $110,000 by Phillips Petroleum Co. for 322.6 acres offsetting production in Block 12 pool of Andrews County.

Two other large drilling blocks were among the offerings.

Small Mid-Continent Refiners Losing Money, Survey Shows

SMALLER refineries in the Mid-Continent area are operating at losses of 5 to 10 cents per barrel of crude run, according to a survey just completed by the Western Petroleum Refiners Association.

The survey covered product yields, operating costs, and realizations of refineries of nonintegrated companies in Kansas, Oklahoma, and Texas having capacities of 4,000 to 8,000 bbl. per day of crude throughput, with both skimming and thermal cracking facilities.

The yields, operating costs, and cost of crude were for the month of March, and were compared with operating costs for the first quarter of 1949. The unit cost of the various refined products were obtained from published prices, and are the most recent minimum quotations.

"From this study," the W.P.R.A. said, "it can readily be seen that the refiner who purchases all or a major portion, of his crude oil cannot continue to operate unless the refined-product prices improve above present levels so as to permit him to at least break even.

"With the demand for heavy residual fuel oil constantly being reduced, his problems are further accentuated. New markets must be found for this product and refinery techniques developed to a greater extent so as to produce less residual fuel oil. The constantly increasing costs of materials and labor in the postwar years have added 65 per cent to his operating costs since 1945."

The following tables give the results of the W.P.R.A. survey. Table 1 is for refineries producing naphthas and asphalts, and Table 2 for plants not making these products.

Gasoline Price Hikes Raise New Investigation Demand

WASHINGTON.—A double-barrelled investigation of gasoline prices by the Department of Justice and Federal Trade Commission was demanded last week by Rep. Hugh J. Addonizio of New Jersey, who charged in a speech on the floor of the House that the recent increases were an example of "economic opportunism" on the part of the oil industry.

Addonizio based his call for a probe on the recent complaint of the American Automobile Association that the latest increase in gasoline prices would cost the average motorist $40 more a year than he paid for gasoline in 1945.

The Congressman wrote identical letters to Attorney General Tom C. Clark and Federal Trade Commissioner Lowell Mason in which he linked price increases to oil-company profits, which he said are greater than ever before in history.

TABLE 1—REFINERIES PRODUCING NAPHTHAS AND ASPHALTS

	Per cent yield	Gallons	Price	Total realization
Gasoline	40.19	....	....	....
Ethyl	....	5.74	10.75	$ .6171
Regular	....	11.15	9.875	1.1011
Kerosine	13.24	5.56	8.5	.4736
Distillate fuel	5.18	2.17	7.375	.1600
Naphtha	10.03	4.21	10.625	.4473
Gas oil	2.92	1.23	6.625	.0815
Asphalt	11.28	4.74	3.857	.1828
Residual fuel oil	11.73	4.93	2.143	.1056
Propane and gases	2.34	.983	5.25	.0516
Loss	3.09	1.29	....	....
Total	100.00	42.00	....	$3.2196
Cost of crude per barrel				$2.633
Manufacturing cost per barrel				.6418
Total				$3.2748
Total realization				3.2196
Loss				$ .0552

TABLE 2—REFINERIES NOT PRODUCING NAPHTHAS AND ASPHALTS

	Per cent yield	Gallons	Price	Total realization
Gasoline	57.64	....	....	....
Ethyl	....	8.23	10.75	$ .8847
Regular	....	15.98	9.875	1.578
Kerosine	4.75	2.0	8.5	.1700
Distillate fuel	8.53	3.58	7.375	.264
Diesel fuel	2.99	1.25	7.5	.0938
Residual fuel	20.91	8.78	2.143	.1880
Propane and gases	2.80	1.18	5.25	.0620
Loss	2.38	1.00	....	....
Total	100.00	42.00	....	$3.2405
Cost of crude per barrel				$2.7439
Manufacturing cost per barrel				.6632
Total				$3.4071
Total realization				3.2405
Loss				$ .1666

Reports Say Mexico To Get $100,000,000

WASHINGTON.—A $100,000,000 loan to Mexico reportedly is being readied in Washington to provide Petroleos Mexicanos with capital needed for facilities in connection with exploration and development contracts entered into with United States operators.

The report that the loan was being whipped up came from Mexico City, apparently contradicting an earlier report that no assistance of any consequence would be provided by the Washington Government.

Secretary of State Dean Acheson, however, stated last week that an application for $100,000,000 was being studied by his department, and Rep. Robert Crosser of Ohio, chairman of the House interstate commerce committee, after visiting President Truman, indicated he was hopeful something would be worked out.

Since announcement of the contracts with the Davies-Pauley-Mosher group some 10 weeks ago, Pemex has entered into two other drilling agreements and is probably working on others.

With additional production, Pemex would need additional facilities which, under the Mexican petroleum laws, would have to be constructed by the organization itself.

Reportedly, the $100,000,000 loan now under consideration would be for the purpose of providing those facilities and, if made, might be followed by other similar advances as development in Mexico required, but there still is no indication that officials in Washington have abandoned their objection to loans for exploration drilling.

Gas-Measure Bill Endorsed

All three members of the Texas Railroad Commission have endorsed a bill to establish a standard measurement for natural gas which has been approved by the lower house and is now pending in the Texas Senate. Opponents of the measure have contended that it would increase the price of gas to consumers, and the commissioners declared this conception is erroneous.

Buyers Cut Crude-Oil Prices In Four Scattered Areas

CRUDE-OIL prices dropped in four separate areas this week and last, with Michigan's high-gravity crude being cut in the most recent price reduction.

The price-cutting announcements involved:

An across-the-board 22-cent cut for all gravities of Michigan crude oil.

Sharp cuts in Rocky Mountain black oils.

A drop of 25 cents in five low-gravity California fields.

A 13-cent reduction in Pennsylvania Grade crude oil, the seventh cut since December 1.

The Michigan price reduction was announced May 16 by the Simrall Division of Roosevelt Oil & Refining Corp. A. W. Winter, Roosevelt president, said the cut applies to all gravities in all fields, irrespective of sulfur content.

Except for a recent reduction in Wesson field, Arkansas, by Berry Asphalt Co., it was the first instance of a price reduction involving high-gravity oil. Practically all oil produced in Michigan is lighter than 30° gravity.

J. E. Boudler, vice president of Simrall, said the reduction represents an "adjustment of comparative values."

Simrall purchases in a number of fields. The company posts flat prices by fields ranging from $2.62 to $3.10, with most running between $2.80 and $2.90.

A representative field is Reed City, where the posting has been $2.84 since November 28, 1947. The new posting is $2.62. Gravity in the field is 46°. Michigan crude has a sulfur content generally higher than that in the Mid-Continent.

Heavy Crudes Reduced

In the Rocky Mountain area, Ohio Oil Co. set the stage for a general price reduction with a price cut averaging 45 cents per barrel for four Wyoming fields producing low-gravity, high-sulfur crudes.

Ohio made the reduction by eliminating the gravity schedule in Byron, Garland, Hidden Dome (heavy), and Oregon Basin fields and instituting a flat price of $1.65. The schedule had run from $1.97 for 15°-gravity crude to $2.23 for 28°-gravity oil.

Stanolind Oil Purchasing Co. immediately met the Ohio price in Oregon Basin, where both purchase, and also cut prices in 14 other fields. Stanolind, however, issued a new gravity schedule in which the price cuts varied from 69 cents for 15°-gravity crude to 2 cents for 35°-gravity crude.

Production in the 15 fields varies from about 17° to 38° in gravity, with most of it running about 22°. All of it has a high-sulfur content.

The old Stanolind schedule ran from $1.97 for 15°-gravity oil to $2.47 for 40° and above, with a 2-cent differential per degree of gravity. The new schedule runs from $1.28 to $2.47 with a 6-cent differential in the heavy grades and 5-cent and 4-cent spreads in the middle and upper portions of the schedule.

The 15 fields are Circle Ridge, Frannie, Gebo, Grass Creek (Embar Tensleep), Hamilton Dome, Kirby Creek, Little Buffalo Basin, Maverick Springs, Oregon Basin, Pilot Butte, Steamboat Butte, Torchlight, Winkleman Dome, Worland Unit, and Zimmerman Butte.

Stanolind Oil & Gas Co. on May 16 met the price reductions, dropping prices in Elk Basin and Salt Creek fields in Wyoming to the levels announced by Stanolind Oil Purchasing Co.

In none of the Rocky Mountain cuts was the price of crude oil lighter than 35° gravity affected.

California Affected

In California, Union Oil Co. of California announced a reduction of 25 cents a barrel in Santa Maria, Cat Canyon, Gato Ridge, Lompoc, and Orcutt fields. Crude from these fields ranges upward from 8° gravity.

Reese H. Taylor, Union president, said the company had found itself producing fuel oil at a rate substantially in excess of the market demand, in spite of the fact that it had shut in 13,000 bbl. daily of its own low-gravity production.

General Petroleum Corp. met the Union reduction May 17.

Penn Grade Down Again

The further decline in the price of Pennsylvania Grade crude oil reflected the continued weakness in demand for lubricating oils.

Both Joseph Seep Purchasing Agency and Valvoline Pipe Lines announced the 13-cent cut, bringing the price of Bradford, Middle District, and Allegheny crudes to $3.27. The price had stood at $5.00 a barrel on December 1.

In another move, Valvoline and Ashland Oil & Refining Co. set a new price of $2.70 for Zanesville crude oil. The new price represented an upward adjustment of 5 cents.

Gasoline Use and Tax Yields Rose Last Year

WASHINGTON. — Motor - vehicle consumption of gasoline last year appears to have been approximately 8 per cent greater than in 1947, according to a report of state gasoline-tax collections issued by the Federal Works Agency.

The FWA announced that the states collected taxes on 30,646,486,000 gal. of motor fuel last year, an increase of 2,239,428,000 gal. over the preceding year, and another 4,598,301,000 gal. was consumed on which no tax or tax at a reduced rate was imposed because it was used for government or nonhighway purposes. The total consumption reported by the states was 35,244,787,000 gal. in 1948 against 32,751,954,000 in 1947.

Of equal interest was the FWA report that motor-vehicle operators paid a total of $1,342,973,000 in state taxes on the gasoline they purchased, which was in addition to the $498,364,790 collected by the federal Government.

The federal Government is content with a tax of 1½ cents per gallon, but the only state to have a tax as low as 2 cents was Missouri, and from there it went up as high as 9 cents in Louisiana, averaging 4.35 cents for the country as a whole.

The $1,841,000,000 paid out in gasoline taxes represents only part of the load on automotive transport, a few more millions being collected in license and inspection fees.

Gasoline-tax revenue is big money in some states, the FWA reported, California collecting $127,177,000, New York $81,291,000, Pennsylvania $78,525,000 and Texas $73,724,000.

Penn-Grade Cuts Bring Demand for Action

WASHINGTON.—Six cuts in the posted prices for Pennsylvania Grade crude have resulted in a flood of appeals to members of Congress from the states in the area for some action that will enable the smaller producers to remain in operation.

The Department of Justice has been asked to look into the matter, and agents reportedly are in the field gathering information. At the same time, the Armed Services Petroleum Board has been asked by the National Petroleum Association to consider the possibilities of stockpiling lubricants so as to provide a market for the Pennsylvania Grade producers until conditions improve.

A number of congressmen from the Pennsylvania grade area report they have received a large number of letters from constituents asking them to see if anything can be done to stiffen the price situation so as to prevent wholesale abandonments.

_____this week

PRICES—Crude-oil prices cut in four areas. . . . All Michigan crude dropped 22 cents by Simrall Division of Roosevelt Oil Refining Corp. . . . In Rocky Mountain area all heavy grades cut sharply. . . . Average is about 45 cents. . . . Union Oil Corp. of California cuts heavy crudes in five fields by 25 cents. . . . Pennsylvania Grade oil cut for seventh time since December 1, last cut of 13 cents, bringing price to $3.27. . . .

PIPE LINES—Newly formed Canadian company plans world longest natural-gas pipe line from Alberta Province to northern California. . . . ¶Contracts awarded to four firms for first 600 miles of 30-in. line for Transcontinental Gas Pipe Line Corp.'s Texas-New York City line. . . . ¶Imperial Oil, Ltd., places $9,000,000 order for steel plate to be fabricated into high-strength pipe for Inter-Provincial Pipe Line Co.'s projected Edmonton-Regina line. . . . ¶Work is now under way on all spreads on the 268-mile, 26-in. line of Atlantic Seaboard Corp. and Virginia Gas Transmission Corp. from Clendenin, W. Va., to Rockville, Md. . . . ¶Mush Creek-Lance Creek line to be laid in Wyoming by Plains Pipe Line Co. . . .

INDUSTRY—Independent producers on West Coast protest action of Shell Oil Co., Inc., in importing Venezuelan crude. . . . Shell officials say lack of sufficient high-gravity crude in California to meet gasoline demands necessitates imports. . . . Bill permitting unitization of fields in Texas approved by both houses of legislature and sent to Governor Jester. . . . Report on imports of foreign oil shows movements continued decline during March. . . .

TRENDS—Refinery gasoline demand for latest 4-week period averaged 7.4 per cent more than in same weeks last year. . . . Combined Mid-Continent and North Central areas were up 9.5 per cent. . . . U. S. gasoline production increased 5 per cent in spite of 7 per cent decrease in crude runs. . . . Gasoline stocks dropped 4,000,000 bbl. in 4 weeks with 57 per cent of withdrawals in Mid-Continent and North Central districts. . . . ¶Heavy crude prices are cut in Wyoming and California. . . . Pennsylvania Grade crude receives seventh cut in 5 months. . . . East Coast kerosine prices are lowered following recent cuts for No. 2 fuel. . . . Gasoline markets remain firm. . . .

REFINING—Completion of Casper, Wyo., Thermofor catalytic cracking unit for Socony-Vacuum Oil Co., Inc., marks end to 7-year period of continuous construction of this type unit. . . . ¶C. F. Braun & Co. to resume work on $10,000,000 construction project at Phillips Petroleum Co.'s Kansas City, Mo., refinery. . . . ¶Pan American Refining Corp. buys triptane plant from General Motors Corp. . . . ¶Kanotex Refining Co. completes revamping of vapor-recovery system at its Arkansas City, Kans., refinery. . . . ¶New sulfur-recovery plant to be built by Girdler Corp. at The Texas Co.'s Eagle Point, N. J., refinery. . . .

NATURAL GASOLINE—Continental Oil Co. will spend $1,500,000 on enlargement of McAllen natural-gasoline plant in Starr County, Tex. . . .

INTERNATIONAL—Turkey joins list of foreign countries seeking oil loans from United States. . . . ¶Plans have been completed for forming joint Italian company. . . . ¶West Pakistan drilling activity continuing. . . . Good oil indications present. . . . ¶Reports from Mexico indicate loan of $100,000,000 being arranged in Washington. . . . ¶Iranian Government now seeking higher royalty payments from Anglo-Iranian Oil Co., Ltd. . . .

An important phase of the Gulf Coast oil industry, a special section on which begins on page 185 of this issue, is offshore drilling, and this picture illustrates the ingenuity required to drill an oil well at sea. Converted from a surplus Coast Guard vessel at a cost of $230,000, this barge-platform combination contains all the supplies and auxiliary equipment necessary to drill 15,000 ft., in addition to crew quarters and communication facilities

Take Active Part in Politics, Oil Men at A.P.I. Meeting Advised

by Robert Harwick
California District Editor

LOS ANGELES.—A plea to "make politics your business in order that you may keep your business and enjoy the full fruits of its products and your labors in it" was made by Lt. Gov. Godwin Knight of California in addressing the spring meeting of the Pacific Coast district of the American Petroleum Institute, Division of Production here May 12-13.

Since the end of the war, half the nations of the world have passed from constitutional government, belief in private property, and free enterprise, to a condition of slave states, Knight said, and the same danger confronts this country unless everyone makes politics his business in order to fight that danger.

"You must know your assemblyman, your state senator, your congressman, and your city and county officials," he told the oil men. "You must see that your family and your business associates do the same thing. You should interest yourselves sufficiently to learn fundamental facts about politics."

As an example of the type of legislation facing this country, Knight cited the administration-sponsored Economic Stability Act now pending in Congress which would authorize the President to construct new plants and facilities, prevent price changes, impose priorities and allocation of materials, and secure information and records from any person without regard to the constitutional guarantee against self-incrimination.

Such legislation, the speaker concluded, can be defeated only by abandoning an "easy-going policy" and by "making politics our business."

New Officers Named

New officers of the Pacific Coast district elected at the meeting were: Chairman, M. B. Standing, California Research Corp., La Habra; vice chairman for Los Angeles Basin, E. Robert Burns, McDonald & Burns, Torrance; vice chairman for San Joaquin Valley, A. B. Dooley, Belridge Oil Co., McKittrick; vice chairman for Coastal district, Benton Turner, Jr., Lloyd Corp., Ventura; vice chairman for Coalinga-Kettleman district, R. W. Walling, Division of Oil and Gas of the California Department of Natural Resources, Coalinga; treasurer, C. T. Reichert, National Supply Co., Torrance.

Among the 14 technical papers presented at the meeting, chief interest centered in a group dealing with various phases of corrosion problems in producing wells. In the report "Economics of Oil-Well Corrosion Control," Robert J. Villagrana and William W. Messick, with Standard Oil Co. of California at La Habra, showed that effective and economical corrosion control can be established with methods now available to the industry. The control, however, requires vigilance, patience and a continuing program. Iron counts combined with production rates were offered as a fair qualitative indication of corrosion.

Data on drill pipe failures and methods of testing and inspecting were reviewed by Walter C. Main of Technical Oil Tool Corp., Ltd., in his paper, "Detection of Incipient Drill-Pipe Failures." Main told of progress and development work in use of the Tuboscope and in use of Magnaflux and Magnaglo. Of special interest was the use of Magnaglo and the Tuboscope in combination for locating minute fatigue cracks. Progress made with the electro-magnetic induction method promises wider use because of the rapidity with which tests can be made.

The difficulties of setting up cathodic protection for well casing and the great need for more information on this subject also was brought forth. In "An Outline of Some Problems in Oil Well Casing Corrosion," G. N. Scott, pipe-line technologist, Los Angeles, suggested a joint investigation on the part of the interested companies with the topical committee of the A.P.I. as the clearing house for information.

Drilling Subjects Covered

Drilling equipment and improved performance also were discussed at the Los Angeles A.P.I. meeting. In "Power Requirements for Rotary Drilling Operations," R. W. Craig, National Supply Co., Torrance, reported that usual requirements of 100 hp. per 1,000-ft. depth rating may not be enough for larger-diameter holes. Power ratings and fuel requirements of various popular engines were compared. Henry E. Winter, Union Oil Co., Whittier, detailed "Problems and Methods of Contract Drilling," discussing the popular types of drilling contracts, their advantages and disadvantages. He emphasized the need of clearly written contracts for both company and contractor but doubted if the perfect "foolproof" contract would ever be made.

Lot Bowen of Western Gulf Oil Co. (left) receiving from R. E. Foss of Barnsdall Oil Co., chairman of the advisory committee, a scroll in appreciation of distinguished and meritorious service to the American Petroleum Institute. The presentation was a feature of the banquet of the Pacific Coast District in Los Angeles May 12. Similar scrolls were awarded to Marshall B. Standing of California Research Corp. and D. J. Hall of McCullough Tool Co.

The forces that cause a well to deviate from the vertical were outlined by F. A. Graser, Cleveland Oil Co., Los Angeles, in "The Fundamental Mechanics of Directional Drilling." Graser presented the geometrical relationship of deflection to original setting. During the sessions a talk entitled "Status of Tidelands Issue" was given by Irving Smith, city attorney of Long Beach. He reported that the California case was at present confused. The problem now is to determine whether the 3-mile line is to be drawn with respect to bays, harbors, and inland waters. D. L. Roberts, Long Beach Oil Development Co., Long Beach, Calif., presented a paper covering "Directional Drilling in the Los Angeles Basin." He told of the history of directional drilling and placed present development beyond the experimental stage and in the area of controlled technique.

Field Practices in California

"Performance of Hydraulic Type Rod Pumping Units in the Santa Fe Area" was the paper of Juan P. Pedretti, with Union Oil Co. at Santa Fe Springs. The performance of these units was discussed from the standpoint of design features, comparisons were made with beam-type pumping

units, and the possibility of slower speeds through longer stroke was brought out.

A summary report covering 3½ years of gas injection was presented in the paper "Performance of Primary Pressure Control in the First, Second, and Third Zones, Newhall-Potrero Field," by Oran A. Graybeal, Barnsdall Oil Co., Los Angeles. Graybeal said that 1,000,000 bbl. more oil were produced than would have been possible without excessive waste in the same time under depletion. However, in addition to producing more oil to date, the present worth of the reservoir today is considerably better than it would otherwise have been. F. S. Fowler, with Standard Oil Co. of California at La Habra, reported on the "Emery West Pool Injection Project." The paper gave a 4½-year case history of gas-injection operations. The problem was complicated by the extensive thickness and permeability variation of the reservoir sand. Selective injection, high injection rate, controlled production were used to overcome these obstacles.

E. R. Brownscombe, R. L. Slobod, and B. H. Caudle, Atlantic Refining Co., Dallas, presented a paper on "Relative Permeability of Cores Desaturated by Capillary Pressure Method." The authors gave a discussion of one method for experimentally determining relative permeability data.

In a report covering an investigation of 769 wells containing sand-control liners, W. Ross Cabeen and Edwin G. Bemis of Wm. Ross Cabeen and Associates, North Hollywood, showed that conventional slotted liners gave highest production performance but at the cost of cleanout and redrill. Prepack gravel liners gave fourth highest production performance, after slotted liners with partial sand control and pump-pack gravel liners, but with less liner failure than any other type; 182 well-washing operations were also examined. The report showed that 49 per cent were successful, 15 per cent marginal, and 36 per cent unsuccessful. The paper was "Field Performance of Sand Control Liners in California." M. P. Tixier, Schlumberger Well Surveying Corp., presented "Electric Log Analysis in the Rocky Mountains." It was a discussion of a method of obtaining a good approximation of the water-saturation and porosity of reservoir rocks encountered in the Rocky Mountains.

Slaughter Gasoline Plant Is Dedicated

LUBBOCK, Tex. — Described as a splendid example of the progress being made in conservation of natural gas in Texas, the 90,000 M.c.f. Slaughter natural-gasoline plant was formally opened May 14.

The three members of the Texas Railroad Commission, officials of the various companies owning the plant, and more than 1,600 oil-company employes and guests from surrounding West Texas towns were present for the dedication. Throughout the day guides showed visitors through the plant and explained the functioning of its equipment.

W. J. Murray, chairman of the commission, was the principal speaker at the brief opening ceremonies held at the plant site, some 5 miles west of Sundown. Because all the gas being processed by the plant formerly had been wasted, Murray felt that its opening was especially representative of progress made in gas conservation during the past 3 years. He stated that in West Texas alone more than 450,000 M.c.f. of casing-head gas daily is being utilized today in excess of the volume being used in 1945. For the state as a whole about 1,200,000 M.c.f. more is being utilized he said.

Murray was introduced by H. D. Herndon, president of Saltmount Oil Co., who served as master of ceremonies. The other two commission members, E. O. Thompson and Olin Culberson, also were introduced and spoke briefly on the progress in gas conservation.

Owned jointly by eight participating companies, the plant is being operated by Stanolind Oil & Gas Co. The other co-owners are: The Texas Co., Honolulu Oil Corp., Magnolia Petroleum Co., Devonian Oil Co., Atlantic Refining Co., Saltmount, and Mid-Continent Petroleum Corp. E. R. Wagner is plant superintendent and N. S. Whitmore is assistant superintendent.

(A detailed engineering article on the Slaughter gasoline plant will appear in the May 26 issue of The Oil and Gas Journal.)

Principals at the dedication ceremonies of Slaughter gasoline plant May 14. Left to right: Harold D. Herndon, president, Saltmount Oil Co., master of ceremonies; Ernest O. Thompson, Texas Railroad Commission; Olin Culberson, member of the commission; and William J. Murray, Jr., commission chairman. More than 1,500 persons attended

Independents Protest Tariff Body's Rebuff

WASHINGTON.—Independent producers expressed resentment this week over the arbitrary manner in which the Tariff Commission rejected their application for an investigation of the effect of reciprocal trade agreement duty cuts on imports of foreign oil.

They pointed out that the commission, in the space of 2½ months, reached the conclusion the import excise taxes had no bearing on the heavy import complained of, which it said were due to efforts to prevent a recurrence of the 1947-48 shortage and the mild winter which cut demand, although less than a year ago the commission admitted it was unable, on the basis of a study of 14 years' experience under the Reciprocal Trade Act, to evaluate the effect of duty reductions on any individual industry.

Two Operating Companies Formed by Frontier Oil

In order to segregate its production and refining activities, Frontier Oil Refining Corp., Buffalo, has formed two new firms. Frontier Oil Refining Corp. will engage solely in refining and marketing, and Breuil Petroleum Corp. will take over 1,200 producing wells in nine states, as well as 200,000 acres of leased oil lands.

Breuil Corp. will supply raw materials to the Frontier enterprises in western New York, which include 110 service stations, a 12,000-bbl. per day refinery in Buffalo, and pipe-line facilities connecting with National Transit Lines, extending south from Buffalo.

Breuil Petroleum will control Kingwood Oil Corp. of Oklahoma.

International

WORLD-WIDE OIL DEVELOPMENTS

Turkey Now Added to List of Countries Seeking Oil Loans

THE state-controlled Turkish oil administration is now attempting to obtain foreign capital to proceed with the large-scale development of its oil resources, particularly at Raman Dag, where it is claimed reserves of major proportions have been discovered.

Turkish Government officials and representatives of Socony-Vacuum Oil Co., Inc., held meetings last month in Ankara, the Turkish capital, on the possibility of interesting this company in the development. Shell officials also have been approached, and it is reported that the Turkish officials have been sounding out the opportunities for a private loan in the United States.

Socony-Vacuum, which has marketing interests in Turkey, recently sent a representative from New York to study the oil situation in Turkey. The discussions which have been held were described as being of a highly tentative and exploratory nature.

No Concessions

These recent moves point up the fact that Turkey is face to face with the dilemma already encountered by several other countries with a state-controlled oil-producing industry, particularly in Latin America. This involves finding some kind of compromise or arrangement whereby, despite the restrictions on private capital, sufficient equipment and technical assistance can be obtained to permit development.

The pattern is familiar. To produce and refine in quantity what oil it may have, Turkey needs dollar assistance, and this means government or private financing, ECA aid, or oil-company participation. Turkish Government officials have declared that there will be no concessions, as usually understood, for the development of the country's petroleum.

Discussing Raman Dag field, Cemil Sait Barlas, minister of economics and commerce, said: "There can never be any question of granting rights or concessions to foreign concerns for the development of Turkish oil, discovered through the work, efforts, and perseverance of Turkish experts." At the same time, the minister added that the government would give careful consideration to "offers of trading capital."

Reports from Ankara said the Turkish public views with suspicion any plans for the entry of foreign capital into the country. Such moves arouse memories of the nineteenth century foreign concessions under the Sultans and the "era of foreign economic domination."

On the other hand, it seems plain that the only hope for large-scale American investments in Turkey lies in some understanding with the Turkish Government regarding use of profits. As far as the oil industry is concerned, freedom of action and guarantees to carry on a continuing private operations would be required. The major oil companies enter into large-scale producing operations as private producers rather than in a drilling-contractor relationship with the government.

According to a recent report from the Turkish capital, the double problem of the Turkish Government is said to be thus one of making it worth the while of foreign companies to invest capital in Raman Dag and of conciliating a public which is likely to regard that foreign capital with suspicion.

Field 9 Years Old

Raman Dag field is in the southeastern part of the country, about 375 miles east of the Mediterranean Coast at Iskanderun. The first well was completed as a producer in April 1940. Drilling continuing since the end of the war has been done by contract with Drilling & Exploration Co., Dallas, using equipment purchased by the Turkish Government. Geophysical work has been by United Geophysical Co. Two rotary rigs are reported running.

At the present time there is no outlet for any substantial amount of production from the field. A small field plant built last year is reported to be now processing about 500 bbl. daily. Another larger plant is under construction near the railhead of Beshiri, about 6 miles north of the field. This would take about 1,400 bbl. daily. Oil also is being run to storage. The crude is very heavy, and the small field plant is producing some asphalt for the government's road-construction program.

There is a lack of detailed and official information on the field itself. It is credited with a production of about 2,000 bbl. daily from about 12 wells on pump. One report published in Ankara said reserves thus far surveyed in the area total some 30,000,000 tons (about 200,000,000 bbl.)

Refinery Planned

The Turkish Institute for Mineral Research, a branch of which has conducted all exploration work in the country since 1935, is in charge of the development at Raman Dag and other exploration in the country. Plans for a refinery have been projected, and an American engineering firm has submitted tentative proposals, including a refinery and another plant for specialty products. The possibility of laying a pipe line to tidewater also has been discussed.

Raman 1, the discovery, was spudded in July 1939. It found oil at 3,455 ft., producing initially about 70 bbl. daily. Water was encountered when the hole was deepened, and the well was abandoned in 1944. Subsequent drilling yielded only a small amount of production in Raman 5 and this well also was abandoned in 1944. The later wells Nos. 8 and 9 were considerably more encouraging. No. 9 was acidized, and was pumped at the rate of 400 bbl. daily by the end of the year.

It appears that more recent drilling and further studies of the field have given rise to the belief that it has a much higher producing potential. As for development, Turkish sources estimated probably $175,000,000 would be required.

Several other prospective producing areas in Turkey have been under investigation.

Plans Completed for Joint Italian Company

STANIC has been chosen as the name of the new refinery operating company to be organized in Italy jointly by Standard Oil Co. (N.J.) and ANIC (Azienda Nazionale Idrogenazione Combustibili).

A preliminary agreement has been signed by the two companies, and a recent ANIC meeting in Milan approved creation of the new company in which each owner will hold 50 per cent.

The new company will operate the former ANIC hydrogenation plants at Bari and Leghorn. These plants were completed early in the war with a capacity of about 6,000 bbl. daily each, the Bari plant using Albanian heavy crude and the Leghorn installation other imported oil.

Plans for modernization of the two refineries are being studied, and capacity may be raised to about 40,000 bbl. daily for both. The Leghorn refinery was damaged during the war, but the equipment has been restored and converted and is running about 7,000 bbl. daily. The Bari plant is now taking about 12,000 bbl. daily. Lubricating-oil equipment at Leghorn was removed during the war, but lube manufacturing may be restored as a part of the modernization.

ANIC itself has plans for the manufacture of various chemicals such as fatty acids, ethylene, propylene, butylene, and isobutylene, using by-products from the refineries. Stanic, the new company, is expected to be formally organized in the next few months.

Brazil Approves Plan For Shale-Oil Plant

The Brazilian Government is reported to have given approval to plans of Cia. Nacional de Minerais Oleo to construct a major commercial oil-shale plant at Taubate in southern Brazil.

Commencement of the project is subject to financing and solution of various exchange problems. The company now has a small existing shale works at Taubate, but the contemplated project is designed for an output of some 6,000 bbl. daily of liquid fuels, about half of which will be motor fuel.

Taubate is about 80 miles northeast of Sao Paulo, where the company has its headquarters. Foster Wheeler Corp. has the contract.

Housing in Saudi Arabia Is Aramco's Big Problem

Housing for employes continues as one of the greatest problems of Arabian American Oil Co., and the company is now able to send each month but 50 per cent of the people needed in Saudi Arabia, according to Ralph S. Fowler, assistant to the president of Aramco.

Fowler said housing illustrates the company's policy of obtaining its supplies outside the United States where possible. More than $3,000,000 worth of portable houses have been purchased in Sweden and outfitted with hardware purchased abroad.

International

"This has meant that countries in Western Europe, buying our oil, have been to an increasing extent supplying the goods and materials we need in Saudi Arabia," he said. "This has meant a conservation of American goods in short supply for American consumption, as well as a supplying of dollars to Western European countries."

He pointed out the company had been forced into operations entirely unrelated with oil operations, and said the company is sincere in its desire to see other companies, both American and Saudi Arabia, take over such activities.

Socony-Vacuum Rigging Up For New Barinas Well

Socony-Vacuum Oil Co. of Venezuela is making preparations to start drilling Silvestre 5 after encountering somewhat disappointing results in Silvestre 4 in the Barinas area of southwestern Venezuela.

The new well, Silvestre 5, is a semi-exploratory operation about 2 km. east of the discovery, Silvestre 2. The area is in the isolated Apure-Barinas Basin, and the company is seeking to determine the size and importance of the discovery before making definite plans for development and a pipe-line outlet. *(The Oil and Gas Journal, April 21, 1949, page 123.)*

Foreign trade executives of Socony-Vacuum Oil Co., Inc., in this country and abroad are holding a 5-week conference in New York. First row, left to right: E. C. Staber, acting aviation sales manager, Shanghai; E. Nielsen, assisting manager and director, Norsk Vacuum Oil Co., A. S., Norway; C. Lawrie, director, Vacuum Oil Co., Ltd., England; Robert Frothingham, acting chairman, foreign trade committee, New York; J. D. Rogers, marketing director, Australia; F. E. Powell, Jr., acting general manager, foreign trade committee, New York; W. L. Faust, Socony-Vacuum board member in charge of foreign trade; G. H. G. Caulton, manager, Vacuum Oil Co., S. P. A., Italy; Francis Smith, member, foreign trade committee, New York; M. M. Van Sandijk, sales manager, Vacuum Oil Co., S. A. B., Holland; E. Dugdale, director and sales manager, Vacuum Oil Co., A. S., Denmark; H. L. Beemer, marketing executive, Japan; Frank Wilder, industrial-relations adviser, foreign trade committee, New York; G. G. Holmquist, general manager, director, chief engineer, and chairman of the board, Vacuum Oil Co., A. B., Finland; D. M. Kinghorn, assistant sales manager, Socony-Vacuum Oil Co., central area, West Africa; H. H. Matthiesson, member of the management board, Deutsche Vacuum Oel, A. G., Germany; F. Paulin, general secretary and director of Socony-Vacuum Francaise, France; Bryan Hunt, assistant general manager, Shanghai; D. C. Ladopoulos, attorney, Socony-Vacuum Oil Co., Greece; Arthur Reed, member, foreign trade committee, New York; F. S. Cooper, New York; B. Lyden, assistant to the board of directors and advertising manager, Vacuum Oil Co., A. B., Sweden; L. H. Tremaine, general manager, East Africa; L. R. Owen, member, foreign trade committee; G. W. Behrman, Jr., marketing executive, Japan

Exploratory Work Still Under Way in Western Pakistan

by J. Coates

J. Coates, senior geologist of Burmah Oil Co., graduated from the Royal School of Mines, London, in 1923. He has been in the geological department of Burmah Oil since, dealing with exploration and development problems of the company's subsidiaries in Burma, Pakistan, and India.

With the partition of India in August 1947, the oil-producing areas in the subcontinent became separated, the Punjab area coming within Pakistan territory and the Assam area within the Indian Union. This article reviews the oil prospects in West Pakistan, which is separated by more than 1,000 miles from East Pakistan. Between the two wings lies part of the Indian Union.

WEST PAKISTAN, which includes the provinces of Sind, Baluchistan, and the Punjab, is a country where oil indications have been known for a very long time.

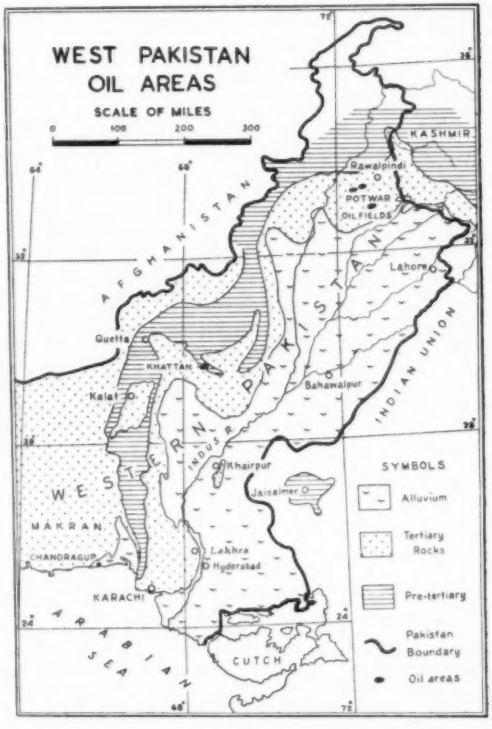
The oil indications are all associated with the belt of Tertiary rocks that runs, roughly speaking, northeastward from Karachi toward the foot of the Himalayas. To the southeast lie extensive plains of alluvium, and to the northwest a belt of older rocks which in general are severely folded and fractured. They usually form sizable mountain ranges, and the Tertiary belt in which the oil shows occur lies in the foothills between the mountains and the plains. It contains structures that grade off from severely folded and overthrust areas near the older rocks to more gentle—and sometimes barely perceptible—structures near the plains.

Oil shows occur in plenty, though mostly in the northern half. In fact, there are (except for the Makran gas shows) no surface indications anywhere south of about Latitude 28°. The best known of these shows, because the earliest tested, are at Khattan (southeast of Quetta) where the Government of India drilled a number of wells, on the pitching end of an open anticline, as far back as 1885. Although they persevered until some 20,000 bbl. of oil had been produced, the venture was a considerable loss financially, which, as is easy to see now, was only natural in that type of structure. At about the same time they drilled several other wells in that region to the same objective — the Dunghan limestone of lower Eocene age—but no good fortune attended them.

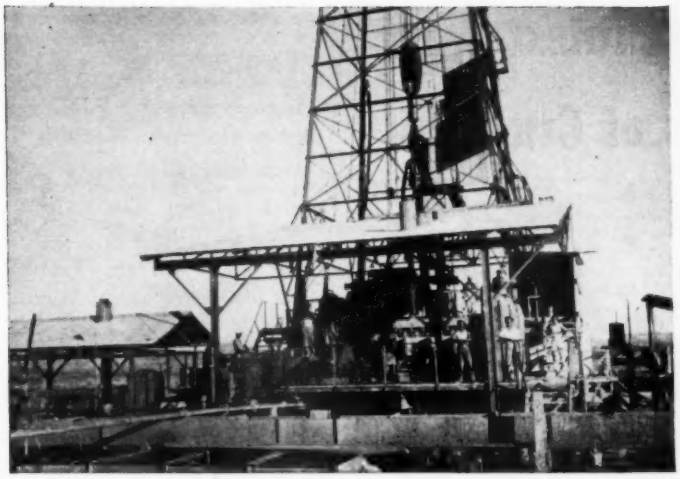
From Khattan, in a general northeasterly direction oil shows continue toward the Punjab. Not all are in the same horizon, for some are apparently in Cretaceous rocks and others in the middle Eocene, which is typical of the Punjab. Little drilling has been done in this relatively narrow belt, partly on account of the inaccessibility of the country and its occupation by independent and warlike tribesmen.

In the Punjab, east of the Indus River, lies the basin of the Potwar plateau, bordered on the south by the Salt Range. Here a number of wells have been drilled and three small oil fields discovered: Khaur (in 1915), Dhulian (1934), and Chakwal (1944), the latter being sometimes referred to by the names of its subdivisions, Joya Mair and Balkassar. A particular interest attaches to Joya Mair in the finding of some oil in beds of Cambrian age. The structures in this region are all small, and the oil fields are of minor importance.

Southwards, in Sind, the complete lack of oil shows in the exposed rocks made drilling unattractive,



Left: One of Burmah Oil Co.'s drilling wells at Chakwal in West Punjab province of West Pakistan. Here B.O.C. is drilling in the known oil-bearing region of the Potwar, near Rawalpindi. Right: Map showing location with known oil areas of Western Pakistan



Rear view of Burmah Oil Co. rig in the desert at Lakhra, West Pakistan, showing draw works and slush pump

though one attempt was made at Khairpur, where a gas show was known. More recently, in an attempt to explore all conceivable possibilities, a deep test has been started at Lakhra, beginning in the lower Eocene beds.

West of all this lies the region of the Makran Coast where gas shows and mud volcanos, but no traces of heavy hydrocarbons, have been known for many years, and a test well was put down in 1916 without success (at Chandragup). Tectonically and stratigraphically this region is separated from the Tertiary belt described above.

Considering the wealth of oil shows in the main belt of Tertiary exposed rocks, the alluvial plains, below which the Tertiaries presumably extend, were in theory a fair prospect, though they offered the double uncertainties of vast areas to search for structure and also doubt whether oil-source conditions extended out under them. Beginning in 1938, and interrupted only by the war period, very extensive geophysical surveys have been made over these plains, by gravity and seismic crews, and the conclusion reached is that, over at least the greater part of the area, there are no indications of closed structures, so that hopes of proving new fields there have practically vanished.

The oil companies still surviving and working in this dominion are Burmah Oil Co. (Pakistan Concessions), Ltd., which carried out the geophysical surveys and has been prospecting since the early days of the century, and Attock Oil Co., which developed the Punjab fields and has done much prospecting in that region. In the fairly recently past Indian Oil Concessions and Whitehall Petroleum

Co. entered the prospecting field but left it without any success.

Iran Seeks Higher Royalty To Finance Development

The Iranian Government has drawn up an elaborate plan for economic development which it hopes to finance to a large degree through increased royalties from Anglo-Iranian Oil Co., Ltd.

Discussions between government officials and representatives of the company over revision of the company's concession terms were initiated some time back. The company's chief delegate in the conferences has been N. A. Gass, a director. Sir William Frazer, A.I.O.C. chairman, recently arrived in Teheran to take part in what was described as the concluding phase of the negotiations.

One primary objective of the Iranian Government is an increase in royalties from A.I.O.C. which now approximate 20 to 22 cents a ton. Last year these royalties totaled about $34,000,000.

The 7-year economic development program by which the Iranians hope to overhaul the entire agriculture and industry of the country calls for an outlay of $656,000,000. The plan contemplates a loan later from the International Bank for Reconstruction and Development to cover about 31 per cent of the total.

An official statement by the Iranian Government in Teheran last week said the talks had been adjourned for 2 weeks. Sir William has returned to London. The Iranians were reported seeking a voice in the company management and a plan for 20 per cent from gross profits before taxation.

Getty Interests Offering To Buy Tide Water Stock

In an effort to extend their holdings of Tide Water Associated Oil Co., the J. Paul Getty interests are offering to buy a sizeable quantity of stock in the company now held in The Netherlands.

According to a report from Amsterdam, a Dutch financial firm is seeking to buy, on behalf of Pacific Western Oil Corp., shares in Tide Water at 120 per cent of the last quotation. Some 550,000 Tide Water shares are reported circulating in Holland.

Getty, who is president of Pacific Western and of Mission Corp., holds through these two companies and Mission Development Co., approximately 32 per cent of the shares in Tide Water which totaled 6,408,132 at the end of 1948. About 4 years ago, 802,664 Tide Water shares were reported owned by the Dutch but presumably some of these have since been liquidated.

Dutch sellers of Tide Water stock have been given the opportunity to reinvest 75 per cent of the proceeds of the sales in a number of dollar securities listed in New York.

Po Valley Well Blowing Wild in Lodi Gas Field

A.G.I.P.'s well 14 in the Lodi (Caviaga) gas field in the upper Po Valley of northern Italy is reported to be still out of control, despite continued efforts to kill the blowout.

The well went out of control March 14 because of failure of a blowout preventer. Dry gas at an estimated rate of 35,000,000 to 45,000,000 cu. ft. daily was flowing through the annulus between the 9⅝-in. casing and the 3½-in. drill pipe. Flowing pressure of nearby wells dropped as a result of the blowout.

Arabian American's Crude Production Up in April

Crude-oil production of Arabian American Oil Co. in Saudi Arabia during April climbed back up to 523,555 bbl. daily, an increase of nearly 34,000 bbl. daily over the figure for March.

Crude processed at the Ras Tanura refinery averaged 141,441 bbl. daily compared to 127,282 bbl. daily in March.

Independents Protest West Coast Imports of Crude Oil

ACTION of Shell Oil Co., Inc., in inaugurating crude-oil imports on the West Coast has aroused protests from independent domestic producers.

The Shell company has brought several cargoes aggregating about 300,000 bbl. into California in the 30-day period ended in early May. Records indicate the movement is the first commercial importation of crude into California since 1933 and earlier, though Standard Oil Co. of California brought in a tanker of Arabian oil early this year for experimental purposes.

L. P. Stockman, secretary of Independent Oil Producers Agency of California, said the organization is "unequivocally opposed to this practice and recognizes the possible implications of such movement and its possible unfavorable effect on California economic conditions." Discussing imports generally in Pittsburgh recently, Russell B. Brown, general counsel of the Independent Petroleum Association of America, mentioned the California imports and said to bring heavy Venezuelan oil to the West Coast is like "bringing coal to Newcastle."

Shell Explains Move

To clarify the West Coast import movement, the Shell company in New York made the following three points:

1. Such crude as Shell Oil has shipped into California or may ship in in the future is not "heavy crude." It is of higher gravity and with a larger gasoline content than the bulk of California's so-called light crude.

2. Recent shipments into California have been considerably less than 10 per cent of Shell's total crude requirements and have averaged much less than this since the first of the year.

3. Shell has always depended heavily on cracking as a means of producing gasoline, and as a result, has been one of the largest producers of heavy fuel oil relative to its refinery intake. With a falling demand for residual fuel and increasing demand for gasoline and intermediates, storage would not hold the heavy fuel that would have to be made to meet gasoline requirements through cracking heavy crude. The cracking of heavy crude had to be curtailed, and if Shell was to do its share in meeting the gasoline and distillate demand of the Pacific Coast, its runs of light refining crude had to be increased.

With its own production and purchases of refining crude at maximum, and with light crude available under a contract made about a year ago when additional supplies of United States crude were unobtainable, Shell is moving Venezuelan crude into California to balance its refining position. Its program in this regard is not fixed, but such imports will certainly be less than 1 per cent of the total California crude-oil production.

It is reported that the California imports of Shell are under a long-term contract with the Venezuelan affiliates of the Shell organization. California reports said the imports were from Mara field. This Cretaceous producing area northwest of Venezuela's Lake Maracaibo in February yielded about 65,000 bbl. daily. Gravity of the oil runs around 30°.

A Shell official discussing the California imports said the simple fact is that the company has been unable to find sufficient light oil on the West Coast to meet its needs. He added the company had made large investments in exploration without notable results. The company had hopes that a third horizon in Signal Hill in 1947 would give major production but this was not realized.

Regina Refinery Fire Cuts Output of Canadian Wells

Temporary reduction of refining capacity in the refinery of Imperial Oil, Ltd., at Regina, Sask., due to an explosion and fire has caused a further cutback of acceptances by Imperial of crude oil from wells in the Edmonton area of central Alberta.

Redwater wells delivering to Imperial can now deliver only 165 bbl. daily per well, compared with the former market proration allowance of 225 bbl. This covers wells owned by Imperial, Royalite, and Western Leaseholds.

Leduc-Woodbend D3 zone wells are reduced to 105 bbl. daily (from former market allowance of 115 bbl.). D2 zone wells are unchanged at allowance of 75 bbl. daily. This affects wells owned by Imperial and a number of independent producers.

Also affected by the Regina refinery handling problem are Imperial Oil's three recent discovery wells. The 1 Imperial-Schoepp, 10,000-bbl. potential Golden Spike discovery, has had its "average test period" oil deliveries reduced from 750 bbl. daily to 400 bbl. The 1 Imperial-Bon Accord, on test from D2 Devonian zone, is being held to a daily gross yield of about 100 bbl. (including 6 to 8 per cent b.s. and w.). The 1 Imperial-Whitemud, Lower Cretaceous discovery, is being held to test yield rate of 75 bbl. daily.

Program Set for A.P.I. Rocky Mountain Meeting

Problems of oil production in the Northwest will be discussed by speakers at the annual meeting of the Rocky Mountain District of the American Petroleum Institute Division of Production at Casper, Wyo., May 26-27.

The first general session, Thursday afternoon, will be addressed by R. L. Wheelock, vice president of the division, and by Samuel B. Pettingill of Pure Oil Co., Chicago, whose subject will be "The Petroleum Industry Proves That Freedom Works." Technical papers scheduled for Friday sessions include:

"Design Features of Plant in the Elk Basin Oil Field—A Conservation Project," by L. R. Lyon, Stanolind Oil & Gas Co., Tulsa; "Drilling and Completion Problems Relating to West Poison Spider Discovery Well," by L. L. McDonald, Pure Oil Co., Billings; "Lance Creek Basal Sundance Repressuring," by R. M. Churchwell, Ohio Oil Co., Casper; "Oil in Western Canada," by M. R. McArthur, Husky Refining Co., Cody; "Drilling and Completion of a Wildcat Well in Southern Utah," by J. W. Gibson, The California Co., Denver; "Oil Industry Information Program," by P. M. Hirth, Continental Oil Co., Denver.

ASPB Dies, Is Placed Under Munitions Board

WASHINGTON.—The Armed Services Petroleum Board passed out of existence as an independent entity of the military establishment May 15, becoming a committee under the Munitions Board with the prospect that the Armed Services Petroleum Purchasing Agency shortly may be merged into the same committee.

The shift was in accordance with Defense Secretary Louis Johnson's policy of minimizing the number of independent boards. No changes in personnel of either the ASPB or the ASPPA appear to be contemplated.

There was some speculation in Washington, however, that the change might restrict the independence the board enjoyed when it reported directly to the Secretary of Defense. Heretofore the board has been free to make its own studies, which it did frequently in cooperation with the oil industry, but the Munitions Board generally has confined its contacts to the Government agencies.

Fined on "Hot Oil" Charge

Skelly Oil Co. pleaded nolo contendere and was fined $2,500 in the United States District Court in New Orleans on six charges of violating the Connally "Hot Oil" Act by interstate shipment of crude oil produced in excess of the amount set by state regulation for the wells involved.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Show No Skeletons

WASHINGTON.—A Senate investigation of lobbying is being held up because some members of the Judiciary Committee are so lop-sided they think the probe ought to cover lobbying by government officials as well as by the "special interests," and since that would probably show that the Government is spending more of the taxpayers' money on propaganda than the taxpayers themselves are spending, that would never do.

The investigation was suggested by President Truman, himself, and was generally viewed as another attempt to "smear" those who had the temerity to suggest opposition to any part of the Administration's program, and the necessary resolution was introduced by Sen. Harley Kilgore of West Virginia.

Reportedly, quite a fight is being waged in the Judiciary Committee against any investigation of lobbying which would be slanted toward industry and organization activities only, and there appears to be a growing sentiment at the Capitol that government propaganda should be controlled.

Several federal agencies have developed lobbying techniques even better than those of industry. Outstanding in this field are the Navy and Air Corps, the Army Engineers and the Bureau of Reclamation, at all of which the Hoover commission pointed a finger, but actually there is probably no branch of the Government which doesn't engage in widespread propaganda, either directly through its own "information" office or more obscurely through "liaison" with members of congressional committees which handle their projects.

Don't Expect Much

THE economic situation now has reached a point where every man can be an economist, with just as good a chance of guessing right as the best product of our foremost universities.

Ask a dozen government experts whither are we drifting and you will get 10 different answers so widely diverse that 1 of them is bound to be right.

The President's economic advisers reportedly told him it was time to pull in his horns on spending and perhaps think of cutting taxes as a needed shot in the arm for industry. But the President suppressed that report and called again for a $4,000,000,000 tax increase, leading even that staunch supporter of the Democratic Party, Sen. J. Howard McGrath of Rhode Island, to comment that when a man calls in a doctor he ought to take his prescription.

Contracting industrial activity and shrinking individual income—the latter dropped by $6,700,000,000 a year between December and March—may be signs of "healthy disinflation" to government economists, but they mean something more concrete to the fellow with something to sell.

The President told a recent news conference that his budget is based on economy, but Senator McCarran of Nevada has written a bill for government development of a synthetic liquid fuels industry which would authorize the Reconstruction Finance Corp. to lend $650,000,000 for the construction of plants, nearly double the amount contemplated in the original Administration bill.

Chairmen of the Senate and House tax committees warned that continued spending might make tax-increase legislation necessary, but suggestions of a 5 per cent cut in appropriations across the board was promptly and forcefully voted down by the Senate.

Economy is easy to talk about generally. But it is difficult for a congressman to talk about it specifically, when it means giving up some project that will bring him favor in his home district.

No Ado About Oil

ADMINISTRATION leaders at the Capitol have pared President Truman's legislative program to the bone in order to avoid keeping Congress in session indefinitely.

Only two "must" bills are currently scheduled by Senate leaders—repeal of the Taft-Hartley Act and ratification of the Atlantic Pact — but those two alone, along with the regular appropriation bills, on which the Senate has made little progress, may serve to keep Congress in session beyond the July 31 adjournment deadline.

The House of Representatives is way ahead of the Senate on its program, having already disposed of all the appropriation bills, and expects to clean up its slate by the end of June.

With no time limit on debate, nobody is willing to predict how long it may take the Senate to dispose of the pact and the labor act but there is general agreement that each of those measures may require several weeks of talk.

From the standpoint of the oil industry, all this means there is little likelihood of action this year on any legislation involving petroleum, such as the tidelands bill or development of a synthetic liquid fuels industry. Both, as well as national oil policy generally, may be the subject of committee attention but there is little probability of anything definite reaching the floor this session.

Brazil Next?

PRESIDENT DUTRA of Brazil is now in this country and Finance Minister Castro is expected to arrive within a few weeks, returning the good-will visits made to that country by President Truman and Secretary of the Treasury Snyder.

While here these officials are expected to discuss financial problems and may, like Mexico's Antonio J. Bermudez, seek a loan from the Export-Import Bank, with which to develop Brazil's petroleum reserves without the modification of domestic laws which would be necessary to permit American companies to undertake operations.

The groundwork for discussions of Brazil's oil problem was laid last March in the so-called Abbink report of the Joint Brazil-United States Technical Commission on which John Abbink of the McGraw-Hill International Corp., New York, served as chairman of the U. S. delegation.

The Abbink report stressed the need for an ample, economical and dependable source of fuel as the basis for Brazil's industrialization. Brazil's coal fields, however, are remote from present industrial centers and the quality of the fuel is poor, while large areas of the country show promising indications of the existence of petroleum.

Present Brazilian laws do not provide a favorable climate for investment by American oil companies, and over the past few years repeated efforts have been made to modify them, so far without success. The government's own exploration work has been highly inadequate.

With the Abbink committee indicating a belief that financial assistance alone will not deal with the situation, any conversations of Brazilian officials in Washington would appear necessarily directed to what support the United States would give if present Brazilian laws were modified so as to give, as in the case of Mexico, opportunity for American participation in the exploration and development of oil reserves.

Unitization Approved in Texas; Oklahoma Senate Votes Repeal

AUSTIN. — An oil unitization law, which in one form or another has faced Texas legislative sessions over a 10-year period, was adopted last week. Final approval was given by the house to Sen. George Moffett's oil unitization bill, which provides "reasonable exceptions" to the antitrust laws to protect conservation. The bill will now be sent to Gov. Beauford H. Jester for his signature.

The bill, which passed the house by a vote of 75 to 54, was drawn up in its final version by the house committee on oil and gas. Representatives turned down all amendments to the pooling plan which previously passed the senate.

The house state affairs committee reported favorably on the bill by Billie M. Jobe of Putman making it "unlawful for any person, firm, or corporation, by the geophysical use of the seismograph, either to shoot or otherwise explore for minerals upon the public roads or highways in Texas without first obtaining the consent of the owners of the minerals under such public roads or highways, and the abutting mineral owners."

Goes to Governor

Senate Bill 315, by Sen. Hill Hudson of Pecos, was passed by the house which would empower the board of regents of the University of Texas to sell, lease, and otherwise control all minerals, other than oil and gas in university lands. The bill now goes to Governer Jester for signature.

The senate last week failed by one vote to bring up the controversial gas-measurement bill, which has already passed the house. The bill would prescribe a legal definition for "cubic foot of gas."

Last Tuesday marked the end of the regular 120-day session as suggested by the constitution as the length of time sessions would last. Pay of legislators was automatically dropped from $10 to $5 per day.

Chance Considered Slim

The Oklahoma Senate last week passed a measure repealing the state's unitization bill, which has been in effect since 1945. It has been referred to the house, where it faces stiff opposition. Observers are inclined to believe that the bill will be doomed by the lower branch, but in the event it is passed, that it will face certain veto by Gov. Roy J. Turner, who has openly opposed the measure.

Royalty owners in Grady and Stephens counties, in the southern part of the state, have been particularly active in efforts to get the legislature to repeal the unitization law.

Compact Asks Federal Legislation on Oil Imports, Natural-Gas Production

THE Interstate Oil Compact Commission closed its spring meeting in Jacksonville last week by selecting Estes Park, Colorado, as the site for the fall meeting, September 1-3, and by adopting resolutions calling on Congress to reduce imports of petroleum and to exempt producers of natural gas from the jurisdiction of the Federal Power Commission.

The import resolution recited that proper administration of state conservation laws requires that imports not exceed quantities needed to supplement domestic production when produced without waste and within maximum efficient rates. Since the beginning of the year, it declared, the state regulatory authorities have been compelled to reduce production by approximately 750,000 bbl. daily because of excessive importation of foreign oil, and that volume of crude, amounting to approximately 15 per cent of domestic production, can be produced without waste and in accordance with approved conservation practices.

"Denial of market outlet to domestic crude petroleum which can be produced without waste results in the restriction or abandonment of efforts to discover and develop new reserves," the resolution stated. "Such effort is advanced primarily by the money received from the sale of domestic crude petroleum. The domestic petroleum industry has given conclusive proof, in the form of additions to discovered reserves, that no danger exists in the forseeable future of scarcity or a deficiency of supply of domestic crude petroleum, provided that conditions exist which enable the industry to carry on the necessary exploratory and development work."

The resolution on natural gas declared that the Federal Power Commission has reversed itself and now seeks to regulate the price of natural gas produced for movement in interstate commerce, and that this would supersede and destroy the jurisdiction of state regulatory bodies. It called on Congress to enact legislation to make certain that the jurisdiction of FPC does not extend to or include the production and gathering of natural gas or the facilities used in connection therewith or the "arm's length" sales of gas made by a producer and gatherer to an interstate pipe-line company.

U.S. Chamber Opposes Federal Oil Activity

WASHINGTON.—The U. S. Chamber of Commerce has gone on record as strongly opposed to the entry of the Government into the actual production of synthetic fuels on a commercial basis but in favor of continued federal research into the development of hydrogenation and other processes.

Resolutions adopted by the chamber at its annual meeting held that the Government has no place in the oil business, either in the production of synthetic fuels or by control of production, end use or price of petroleum and natural gas.

At the same time the chamber went on record against any efforts, legislative or otherwise, to break the petroleum industry into separate parts.

Government competition in the field of synthetic fuels, it was asserted, "would tend to discourage private industry from entering the synthetics field, and would thereby retard full-scale commercial development."

A resolution on public lands took no position on the tidelands issue but called for amendment of the Mineral Leasing Act to require that the Government either take its royalty in kind at the well for sale by it or accept the market value of the royalty oil as determined by a court of competent jurisdiction.

It also called for amendment of the unit-plan regulations of the Interior Department to eliminate control of operating functions and confine department authority solely to the protection of the Government's interest as a royalty owner.

A third amendment recommended would modify the Mineral Leasing Act for acquired lands, approved in August 1947, to permit lands within incorporated cities and lands set apart for military purposes to be developed for oil and gas when not inconsistent with the governmental purpose for which they are held, or to be protected from drainage or threatened drainage.

Senate Begins Hearings on Natural-Gas Act Amendment

WASHINGTON.—A Senate interstate commerce subcommittee opened hearings this week on revision of the Natural Gas Act to protect independent producers and gatherers, with indications from the make-up of the group that the bill, sponsored by Senators Kerr and Thomas of Oklahoma, will be favorably reported to the full committee.

The subcommittee is headed by Sen. Edwin C. Johnson of Colorado, chairman of the full committee, with Francis J. Myers of Pennsylvania, Ernest W. McFarland of Arizona, John W. Bricker of Ohio, and Clyde M. Reed of Kansas as members.

Instructions Incomplete

At the outset of the hearing, Johnson said the Kerr-Thomas bill is designed to meet the situation arising out of the reading of two interpretations of the law in the commission and suggested that the "instability of commission thinking" can only mean that Congress' instructions were incomplete.

"As the situation now stands," Johnson said, "the natural-gas producers are distrustful and harassed by confusion because of the Federal Power Commission's somersault performance. The producers apparently feel that the commission has arbitrarily taken over the duties of Congress and begun legislating new laws of its own in an effort to set up a unilateral OPA for the natural-gas industry alone.

"If Congress believes the commission needs the authority assumed in the current interpretation of the act, then the commission should be supported by clear-cut language which could have one and only one interpretation.

"If, however, this need is not shown conclusively and Congress feels that the original interpretation should prevail, then this decision should be rewritten into language which members of the commission and the courts will have no difficulty understanding and enforcing."

Thompson Testifies

First witness to testify before the subcommittee was Ernest O. Thompson of the Texas Railroad Commission, who said amendment of the act will make the producers of gas feel free to sell their gas to interstate pipe-line companies without having the fear of coming under the utility provisions which would limit their returns on their entire enterprise to about 6 or 6½ per cent.

The subcommittee heard a number of witnesses, including Hayden Reed, Corpus Christi, Tex, attorney; O. C. Bailey, Arkansas member of the Interstate Oil Compact Commission; Jeff Robertson, Kansas Corporation Commission; Maj. B. A. Hardey, Shreveport, La., producer; R. G. Lawton, McAlester Fuel Co., Magnolia, Ark.; Guy S. Warren, Corpus Christi, independent producer; Colin Rae, Skelly Oil Co., Tulsa; and E. Huffman Lewis, Shreveport. Later it will call the members of the FPC to present their views individually.

Downward Trend in Oil Imports Continues

WASHINGTON.—Imports of oil in March continued the downward trend manifested in February, but reduced receipts of crude were partly offset by a 15,000-bbl. daily increase in refined products, according to figures of the Department of Commerce.

Daily average imports of all oils during the month were 541,000 bbl., compared with 612,000 in February and 646,000 in January.

Crude imports averaged 373,000 bbl. daily against 459,000 in February and 474,000 in January, while receipts of products were 164,000 bbl. against 151,000 in February and 165,000 in January.

The March figures showed a sharp cut back in imports from the Middle East, with receipts from Saudi Arabia falling from 87,000 bbl. daily in February to 40,000, from Kuwait from 70,000 to 50,000, and from Iran from 16,000 to 4,000. While the drop from February to March was 79,000 bbl. daily, the decline from January to March was only 56,000 bbl. On the other hand, the 224,000 bbl. daily imported from Venezuela was 25,000 bbl. less than in February and 58,000 bbl. under the January average.

The increase in imports of products was almost entirely in residual fuel oil, which jumped to 164,000 bbl. daily from 151,000 in February, all but 2,000 bbl. of the March imports were from the Netherlands West Indies. Receipts also included 3,000 bbl. daily of distillate fuel oil, against none in February, and 1,000 bbl. daily of other products, not including motor gasoline, compared with 2,000 bbl. daily in February.

The department figures showed that while crude imports from Venezuela have been reduced, those from Colombia and Mexico are increasing, the former from 24,000 bbl. daily in February to 35,000 in March and the latter from 13,000 to 20,000.

Shell Will Spend More On Exploration, Drilling

HOUSTON. — Larger expenditures on exploration and drilling activities will be made this year by Shell Oil Co., Inc., as compared with last year, H.S.M. Burns, president of Shell, said here last week. Less, however, will be spent on new construction, he said, thus bringing the over-all company expenditures for the year to about the same level as last.

Burns visited Shell installations in this area last week and conferred with company officials.

Next Week

Shell Chemical Corp.'s New $50,000,000 Plant.—L. S. McCaslin, Jr., of the Journal's Houston office, describes this new unit, located adjacent to Shell's Deer Park refinery.

Slaughter Gasoline Plant.—Three Stanolind engineers describe this new West Texas plant which will manufacture 242,000 gal. of liquid products a day.

Grease Plant for West Coast.—Highlights and photo coverage of Standard Oil Co. of California's new operation at its Richmond refinery.

Wire Lines for Cable Tool Drilling.—R. B. Anderson, Columbian Carbon Co., Charleston, W. Va., discusses practical aspects of this problem.

Cable Tool Drilling, High Stroke Rates.—John F. Kendrick, consulting engineer and long-time investigator of improvements for cable tool operations, gives additional findings.

Shell Oil Lube Plant.—Over-all equipment features for this new Houston installation.

Sun Oil Laboratory.—Description of this new $350,000 unit at Beaumont, Texas, devoted to Sun's geophysical operations.

Electrodrill Coring.—Features of obtaining representative cores by this method, by A. Arutunoff, the inventor.

Hydrafrac.—Discussion of new method of hydraulically fracturing oil and gas formations, from J. B. Clark, Stanolind Oil and Gas Co.

PERSONALS

Jacobsen Aided in Gulf Coast's Oil Production

WHEN reviewing records of drilling activities on the Texas Gulf Coast, one will invariably run across the name of Charles Jacobsen, pioneer production superintendent for Barnsdall Oil Co., at Victoria, Tex., who is credited with discovering the prolific Placedo field east of that city.

Serving Barnsdall for the past 35 years, Jacobsen brought in the company's first Texas Gulf Coast well. In addition, he pioneered in Louisiana fields and is credited with other discoveries in South Texas. The Placedo discovery opened up a new pay horizon which has proven to be a substantial contributor to the company's monthly production in the Gulf Coast area.

Joining Barnsdall in 1912 in Dewey, Okla., Jacobsen was hired to help lay a 2-mile, 2-in. water line on the company's Fannie Knight and Hamilton leases, between Bartlesville and Dewey.

Jacobsen later was transferred to "Ragtown" in the Osage Indian territory, where he was soon promoted to gangpusher and, later, to foreman. In 1917 he was transferred to Barnsdall's Tulsa district, in what was then known as "Flat Rock" where he served as assistant to F. A. Davis, district superintendent. In 1920 Barnsdall purchased Big Heart Refining Co., and shortly afterward Jacobsen was moved into the area as district superintendent. Since Barnsdall's holdings were the town's chief asset, he and a group of oil men proceeded in inducing the town to change its name to Barnsdall.

By 1924 Barnsdall Oil's operations became so widespread that the company's home office was moved from Bartlesville to Tulsa. Jacobsen then joined the Tulsa district as general superintendent of production.

When Barnsdall decided to develop its properties in Louisiana in 1934, Jacobsen was sent in to supervise drilling activities. His first big discovery was Barnsdall's 1 Fontenot, in Northern Louisiana. Six additional producing wells were drilled, and then Jacobsen was transferred to South Texas, where he proceeded to develop company properties in and around Victoria.

Placedo's discovery well, Barnsdall 1 E. G. Gray, was the company's first big producer on the Texas Gulf Coast. Its completion marked active development of the newly found Greta sand (comparatively shallow). In July 1936 Jacobsen brought in the first well in Flour Bluff field, and the field today has 130 producers. Shortly afterward, he discovered the McFaddin pool. This pool now has 39 producers.

Well known in production circles, Jacobsen serves as a director of Victoria Bank & Trust Co., is chairman of the Boy Scout activities of the Rotary club, and is a director of the Victoria Chamber of Commerce.

Thomas E. Matson, of the geological department of Pure Oil Co., Tulsa, has been made district geologist for the company at Ardmore, Okla. **William R. Pampe,** geologist, Tulsa, has also been transferred to the Ardmore office. **Carl W. Nelson,** geologist at Amarillo, Tex., has been made district geologist with headquarters in Oklahoma City, and **Robert E. Loftus,** geologist in the Tulsa office, has been transferred to the Oklahoma City office.

I. H. Hughes, assistant division manager at the La Brea-Parina Estate for International Petroleum Co., Peru, arrived recently in the United States for a business trip. He is attending the Esso Training Center at Elizabeth, N. J.

James K. Ellis has resigned as vice president in charge of production of Sunray Oil Corp. to accept a position with the Slick-Urschel oil interests, San Antonio. He will continue as a director of Sunray.

D. L. McCann has been appointed supervisor of the utility department of the Casper, Wyo., refinery of Socony-Vacuum Oil Co., Inc. For the past 3 years McCann has been connected with the process-engineering section of the company's refinery at Augusta, Kans. He joined the company in 1937 after graduating from the University of Illinois.

C. A. Moon, production manager for Socony-Vacuum Oil Co. of Venezuela, has left Caracas for a trip to England. **A. H. Taylor,** safety and training director of the company, has returned to Caracas following a brief home-office visit in New York City.

Claude R. Kates, for the past 2 years Shreveport district field and section foreman for United Gas Pipe Line Co., has been transferred to the Monroe district as section foreman. **Leroy Tucker,** crew foreman in the Monroe district, has been transferred to the Shreveport area as maintenance crew foreman in Rodessa field.

Harold M. Fritts, formerly geologist for Shell Oil Co., Inc., on the company's regional staff in Houston, has been named exploration manager for Shell Oil Co. of Canada, Ltd., and will make his headquarters in Calgary, Alta. Joining Shell in early 1927, Fritts has worked in practically all of the company's exploration districts of the former Texas-Gulf area and in the office of the vice president of exploration in St. Louis. Since November 1946 he has been a member of the regional staff representing the Midland area and supervising activities of the geological training program.

Charles P. Neidig, chemical-products division, Atlantic Refining Co., Philadelphia, has been elected to a 3-year term as councilor for the American Institute of Chemicals.

P. V. Anderson, Midland, Tex., has joined the firm of W. D. Anderson & Sons, Midland independent geologists and oil operators. He formerly was a geologist for Humble Oil & Refining Co.

C. C. Book, engineer with Republic Natural Gas Co. at Dallas, has been transferred to the company's office at Pauls Valley, Okla.

A. E. Makoski, Esso Standard Oil Co., has been transferred from the New Jersey works to become head of the newly organized general service department at the Baltimore refinery.

P. B. Wolfe, who has been with Sinclair Wyoming Oil Co. at Midwest, Wyo., has moved to Cromwell, Okla., with Sinclair Prairie Oil Co.

Carl Vanhooser, superintendent, Kingwood Oil Co., Perry, Okla., has been transferred to the Oklahoma City area.

Richard Godfrey has been promoted to manager of the production and development department of Bahrein Petroleum Co., Ltd. He joined Bapco as a petroleum engineer in September 1937 and has been stationed at Bahrein on the Persian Gulf since that time.

J. B. Harshman, manager of the pipe-line department of Utah Oil Refining Co., Salt Lake City, has resigned. He has not announced his future plans. Harshman is being succeeded by **H. M. Hill,** formerly superintendent of the Wyoming division, Stanolind Pipe Line Co.

M. E. Forney, formerly associated with the San Antonio geological department of Atlantic Refining Co., has joined Deep Rock Oil Corp. as its Southwest Texas district geologist in the San Antonio office.

G. C. Clark, Stanolind Oil & Gas Co. district geologist at Tyler, Tex., has been elected president of the East Texas Geological Society, succeeding **Philip S. Schenek,** Atlantic Refining Co. Other officers named were **Howard H. Hester,** assistant district geologist, Shell Oil Co., Inc., vice president; **Rosella Bunch,** also with Shell, secretary-treasurer; and **Ray Trowbridge,** Trowbridge Sample Service, committeeman-at-large.

S. G. Darling, Darling Gas Co., Pratt, Kans., was elected president of the Liquefied-Petroleum Gas Association at the group's annual meeting in Chicago. Other new officers are: **Edward C. McEneany,** Diablo Co., Walnut Creek, Calif., first vice president; **W. S. Lander,** Rulane Gas Co., Charlotte, N. C., second vice president; **Walter Miller,** Dry Gas Corp., Chicago, treasurer; **Howard D. White,** Chicago, executive vice president; and **Arthur C. Kreutzer,** Chicago, secretary.

Marcel Thomas, director in New York of the United States office of the French agency, G.A.C. (Groupement d'Achat des Carburants), has left New York for a business trip to Paris. He is scheduled to return June 2.

R. E. Lindsay, Casper, Wyo., has been named district geologist for Tide Water Associated Oil Co. in the Rocky Mountain region. He formerly was in charge of geophysical work in that area for the company. Lindsay succeeds **R. L. Tallant,** who resigned and who will open an office as consulting geologist in Salt Lake City.

Louis J. Subuski, an employe of Esso Standard Oil Co.'s Bayway, N. J., refinery since 1935, has been promoted to supervisor of the protection department.

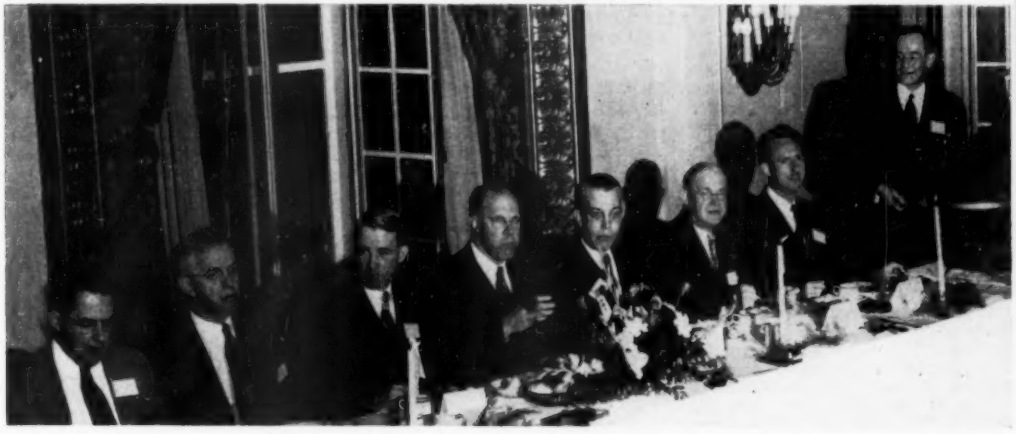
Julian O. Myers, senior geologist for Shell Oil Co., Inc., at San Antonio, has retired after 23 years' service. He was area geologist in Houston from 1942 until 1946, at which time he was made senior geologist at San Antonio.

Dr. Charles L. Shrewsbury, noted biochemist and agricultural chemistry authority, has joined the staff of Southwest Research Institute of San Antonio and Houston. He will serve as associate director of the Foundation of Applied Research, an affiliate of the Southwest Research Institute.

William M. Smith has been appointed assistant supervising engineer in the process design division of the Esso engineering department. Esso Standard Oil Co., Bayway, N. J.

W. S. Calmes has been transferred to the Mene Grande Oil Co. after a 2½-year assignment with Colombian Gulf Oil Co., Bogota. Prior to his transfer, he worked for many years in the material department in the Lake Basin area in Venezuela.

Hugh R. Cullen, independent oil operator of Houston, has given $550,000 to finance a new power plant for the University of Houston. This gift



Dr. M. E. Spaght, president of Shell Development Co., San Francisco, was the featured engineering speaker at the banquet held during the regional American Institute of Chemical Engineers meeting in Tulsa May 8-11, and attended by over 600 chemical and petroleum engineers. Shown at the speakers table are left to right: Prof. R. L. Huntington, head of the chemical-engineering department, University of Oklahoma, Norman; W. I. Burt, vice president, research, Goodrich Chemical Co., Cleveland; C. R. Ringham, Phillips Petroleum Co., Bartlesville, Okla. (meeting chairman); Dr. George G. Brown, head of the department of chemical engineering, University of Michigan, Ann Arbor; Prof. W. L. Nelson, technical editor of The Oil and Gas Journal and head of the petroleum refining department, University of Tulsa; F. J. Curtis, vice president of Monsanto Chemical Co., St. Louis, and president of A.I.Ch.E.; Dr. Spaght; L. W. Bass, vice president, research, U. S. Industrial Chemicals, Inc., New York

PERSONALS

brings to $7,000,000 the total that he and his wife have given to the university.

Henry Suhr, Oil City, Pa., has been elected to the board of directors of Pennzoil Co., succeeding **R. A. Browne.**

G. F. Moore has been named division gas superintendent for Stanolind Oil & Gas Co. at Casper, Wyo. He will be in charge of technical phases of operations of the company's natural-gasoline, cycling, and pressure-maintenance plants. **F. F. Diwoky** has been named division gas superintendent for the company at Oklahoma City, a newly created post, and **J. W. Roach** has been named to a similar position at Fort Worth, also a newly created post.

W. H. Stueve, executive assistant, Oklahoma Gas & Electric Co., has been selected a member of Oklahoma University chapter of Tau Beta Pi, national honorary engineering society.

E. E. Clouatre, formerly general foreman of the light-ends division in the Baton Rouge refinery of Esso Standard Oil Co., has been named night superintendent to succeed **Sidney J. Wax. J. T. O'Brien,** formerly general foreman of the utilities division, succeeded Clouatre. **H. S. Bourgeois,** a division foreman in utilities, became general foreman, and **R. N. Reed,** formerly of the maintenance and construction department, was named assistant to Bourgeois.

Richard H. Smith has been appointed general production superintendent of Signal Oil & Gas Co., succeeding **E. L. Davis,** who has resigned to accept a position with Arctic Contractors. **Harry C. Meyer** has been named assistant general production superintendent, and **Paul Andrews,** chief production engineer. **C. C. Liedholm** has been appointed chief petroleum engineer. Davis assumes the position with Arctic Contractors formerly held by **Bart Gillespie** who has been appointed general manager of the new Mexican American Independent Oil Co.

Five former assistant vice presidents of Tide Water Associated Oil Co. were named full vice presidents following the company's annual meeting: **H. T. Earl,** San Francisco, in charge of purchases and exchanges of crude and products, western division; **H. B. Haney,** San Francisco, manager of transportation, western division; **R. K. Kelly,** New York, manager of marine operations, eastern division; **G. R. Kinter,** Tulsa, manager of manufacturing, Mid-Continent division; and **J. E. Roth,** Tulsa, production manager, Mid-Continent division.

Barney Boak, formerly of Mene Grande Oil Co.'s pipe-line department at Puerto la Cruz, left Venezuela recently for Philadelphia where he will reenter Gulf Oil Corp. service.

C. W. Michaels, Shell Oil Co., Inc., Wichita, has been transferred to the Tulsa office, to fill the newly created position of chief scout for the company.

George M. Richardson, district foreman, Carter Oil Co., St. Elmo, Ill., has been transferred to Carmi, Ill. **Clayton L. Roloson,** geologist for the company, has moved from Oklahoma City to the main offices in Tulsa.

Harry H. Emmerich has been transferred from the Wichita, Kans., geological offices of Magnolia Petroleum Co. to Dallas, where he will be research associate in the company's field research laboratory.

Ralph P. Bolton, producing-coordinating department, Standard Oil Co. (N. J.), has been appointed company representative for producing and refining affiliates in Italy. He joined the firm 25 years ago as field assistant for a Romanian affiliate and since 1944 has headed the company's producing activities in the Eastern Hemisphere.

SHIFTS—

R. R. Barr, foreman, Shell Oil Co., Inc., Eagle Lake to Kemp, Tex.; **Jerry V. George,** engineer, Magnolia Petroleum Co., Milford to Brownfield, Tex.; **O. L. Chenoweth, Jr.,** superintendent, Montex Drilling Co., Brownfield to Snyder, Tex.; **O. H. Berry,** engineer, Standard Oil Co. of Texas, Encino, Tex., to Houston; **L. L. Chisholm,** superintendent, Danciger Oil & Refining Co., Fort Worth to Norman, Okla.; **James C. Craig,** superintendent, Continental Oil Co., Houston to New Orleans; **H. L. Hensley,** superintendent, Humble Oil & Refining Co., Katy to Midland, Tex.; **Ralston Brown,** geologist, Floyd Dodson Co., San Angelo to Abilene, Tex.

N. T. Johnson, superintendent, Circle Drilling Co., St. Martinville to Eunice, La.; **Otto Wendenburg,** geologist, Gulf Research & Development Co., West Monroe, La., to Laurel, Miss.; **O. V. Stuckey,** engineer, Gulf Oil Corp., Harvey, La., to Beaumont, Tex.; **A. C. Christenson,** superintendent, Stanolind Oil & Gas Co., Shreveport to Colorado Springs, Colo.; **George T. Crouse,** geologist, The Texas Co., Charleston, W. Va., to Shawnee, Okla.; **W. O. Allen,** geologist, National Cooperative Refinery Association, Wichita to Oklahoma City; **William L. Carr,** geologist, Pure Oil Co., Billings, Mont., to Clare, Mich.

W. J. Arnold, foreman, American Petroleum Corp., Fairview, Okla., to Lamesa, Tex.; **E. B. Nicholson,** engineer, Continental Oil Co., Ponca City, Okla., to Calgary, Alt., Canada; **Donald W. Hoey,** engineer, Gulf Oil Corp., Tulsa to Hobbs, N. M.; **Lamar Strickland,** engineer, Chicago Corp., Bishop to Freeport, Tex.; **J. B. Moulden,** superintendent, Grey-Wolf Drilling Co., Falfurrias to La Marque, Tex.; **C. D. Wakefield,** geologist, Marine Exploration Co., Morgan City, La., to Bay City, Tex.; **Forrest L. Fry,** superintendent, Noble Drilling Corp., Casper to Moorcroft, Wyo.

DEATHS

Charles R. Gerth, 58, retired executive of Tide Water Associated Oil Co., died May 12 in Norwalk, Conn. He joined Tide Water in 1927 and served as general manager of its German subsidiary until outbreak of the war.

John M. Tweddle, 59, who joined Standard Oil Co. of Brazil in 1913 and later served for many years as a traveling auditor for Standard Oil Co. (N.J.), prior to his retirement in 1947, died May 10 in New York City.

William H. Miller, 78, Clarendon, Tex., pioneer oil driller, died May 10.

Dr. Philip Sidney Smith, 71, Washington, D. C., geologist and engineer, died May 10.

Harry E. Kiser, Tulsa, former scout for Carter Oil Co., died May 16.

J. D. McCalren, 59, Pawhuska, Okla., former office manager of oil and gas division, Osage Indian Agency, died May 12.

George W. Dawley, 52, Fort Worth independent geologist, died May 7.

Gail V. James, 56, Sand Springs, Okla., veteran oil driller of Freeport, Tex., area fields, died May 12.

Guy M. Harrell, Sr., Baton Rouge, La., shift foreman at Esso Standard Oil Co.'s Baton Rouge refinery, died recently.

Calvin James Dean, 50, senior petroleum engineer for General Petroleum Corp., Los Angeles, died in South Pasadena, Calif., May 9.

Wallace Augustine, 72, Tulsa independent oil operator, died May 16.

Benedum Field Is Established As Three-Pay Major Reserve

by Charles J. Deegan

An article was published in the April 21 issue of the Journal concerned with Benedum field in West Texas. The conclusions as to probable reserves and extent of field were in error. In this article, the author presents data based on further studies and explains recent developments which have increased the importance of the field as a major discovery.

IN Benedum field of Upton-Reagan counties, West Texas, recent developments in the Pennsylvanian pay on the east side, as well as more information on the Fusselman (Silurian) on the west side have been significant. These pays now appear to be important reserves in their own right. Previously there has been some tendency for them to be overshadowed completely by the Ellenburger pay, and by some observers at least, looked at as merely supplemental pays. They now loom as widespread producing horizons of substantial reserves in a field that was considered an outstanding 1948 discovery on the basis of the Ellenburger pay alone.

The delay in the emergence of these two pays has been due in part to the rush of problems encountered in developing this field so actively. Benedum is a complex field to understand. Of that there is no doubt. In part this is due to the problems encountered in drilling wells to what up to now has been the main pay, the Ellenburger. Drilling 11,000 to 12,000-ft. wells in the hard-rock country of West Texas is neither easy nor simple. Drilling them at a reasonable cost, while attempting to secure all available information on shallower pays, and as much reservoir data as possible, involves decisions with as many angles to be weighed as a move in a chess game.

Water Level Lower

There is a minimum of 4,400 productive acres in the Ellenburger pay. Where the water level was once thought to be as high as —8,831 ft., it now looks as though it cannot possibly be any higher than —8,915 ft., and may not be that high.

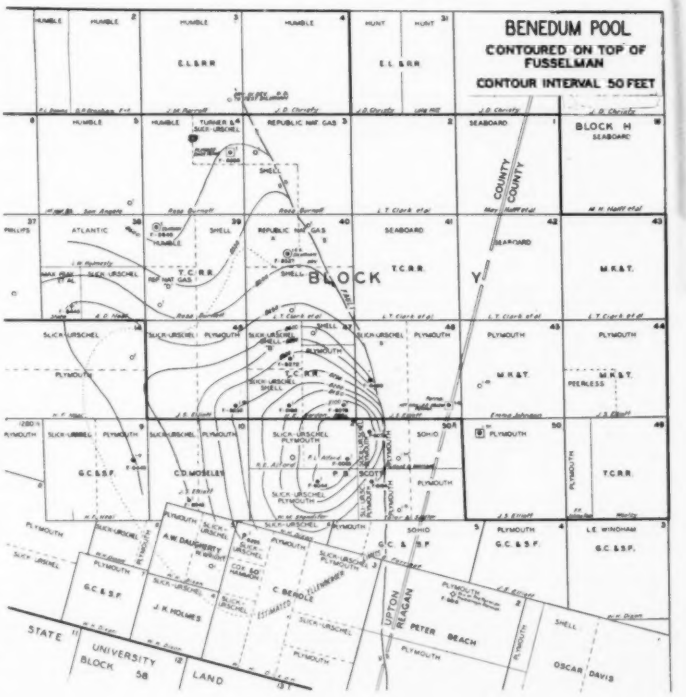
Over this 4,400 acres the thickness of the Ellenburger pay will vary, of course. There is probably a minimum of about 580 ft. on top of the structure, and of course zero at the edge of the productive zone downdip. But isopach maps, based on the thickness of pay section in all wells drilled, give an average pay thickness of at least 250 ft. over the 4,400 acres considered proven.

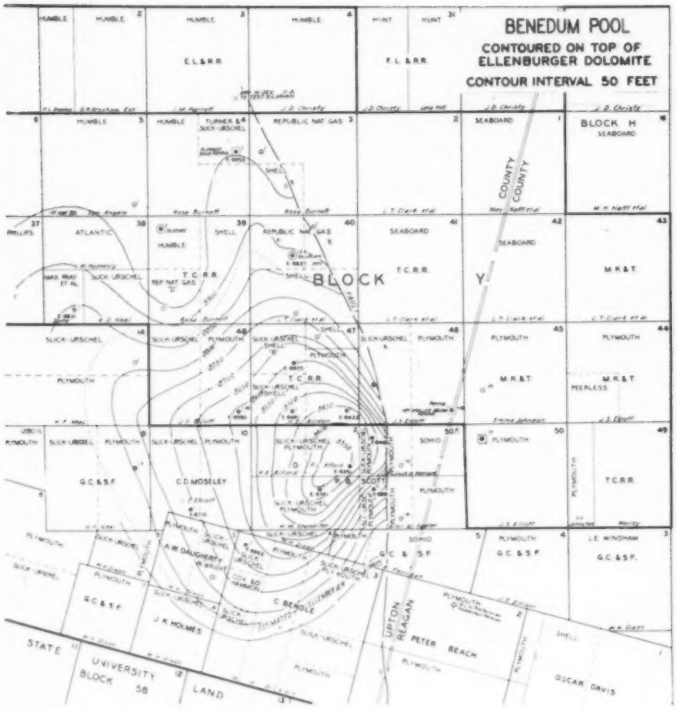
Coring has been difficult and on the whole risky and unsatisfactory. On the basis of a diamond core recovered from the Standifer well, (a southwest diagonal offset to the discovery), and the way the pay drills, some conclusions have been reached. It is believed that here, as in many other places, the oil in the Ellenburger comes mainly from fractures, rather than from conventional porosity.

The nearest geologically comparable Ellenburger production is at Big Lake field, only a few miles southeast. Geologists and engineers point out that with an average Ellenburger pay thickness of only 65 ft. (compared to 250 ft. at Benedum), Big Lake's Ellenburger has already produced over 20,000 bbl. of oil per acre, and will probably have an ultimate recovery of around 25,000 bbl. per acre, even though production methods in those early days of the Ellenburger were not as effective as at present. The discovery well at Benedum, up to April 1, 1949, had produced 180,049 bbl., over a period of approximately 15 months, with no evidence of either pressure or volume decline. This is equal to about 2,250 bbl. per acre, for an 80-acre area.

From slightly different approaches, Plymouth and Slick-Urschel geologists and engineers seem to arrive at about the same place in their estimates of minimum ultimate recovery from the Ellenburger, at least on their respective properties. Plymouth people are of the firm opinion that 20,000 to 25,000 bbl. per acre is a very conservative estimate. Slick-Urschel people, while not willing to commit themselves on any definite figure, do agree that Plymouth's estimate is very conservative.

The Fusselman pay of the Silurian looks like it is going to make an important contribution to the payoff at Benedum. Some geologists are already predicting that the ultimate recovery to be reasonably expected from the Fusselman will be 12,000 to 15,000 bbl. per acre. Although the pay thickness over the productive area looks like an average of about 75 ft. vs. 250 ft. in the Ellenburger, the Fusselman has a granular type of porosity





by drilling rig, creating a dangerous fire hazard. With packer set at 10,935 ft., Fusselman top called at 10,952 ft., and total depth of 11,016 ft., the 64-ft. Fusselman section showed a shutin pressure of 5,032 psi. in 35 minutes. It was opened for a 12-minute flow period, had gas to the surface in 3 minutes, and fluid in 5½ minutes. When tool was pulled, there was a recovery of 250 ft. of oil. Initial flowing pressure was 3,334 psi., and final flowing pressure was 2,450 psi.

Plymouth 1-9 Neal, SE NE Section 9, GC&SF Survey, on the southwest side of the field has been completed in the Ellenburger, but will make a Fusselman producer, if it should be decided to open up that zone later. Slick-Urschel 1 Neal, 1 mile north in SE NE Section 14, looks like it should be high enough to get both Fusselman and Ellenburger production.

Based on evidence so far, geologists believe the Fusselman will probably produce over about the same area as the Ellenburger, plus an additional area farther downdip. At the moment a conservative estimate of the ultimate Fusselman productive area would be around 5,000 to 5,500 acres, with an indicated average pay thickness of 75 ft., based on a range of thicknesses between 69 ft. and 80 ft. checked so far.

The Pennsylvanian pay, at one time

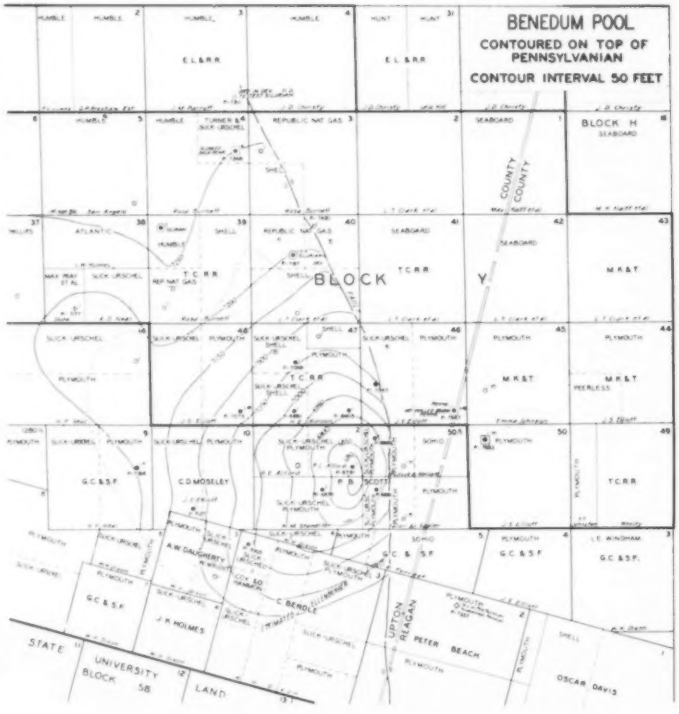
(Continued on page 401)

that should give higher yields per acre-foot.

The subsurface structure map on top of the Fusselman resembles that on the Ellenburger. However, it is now apparent that the Fusselman pay will produce farther downdip than the Ellenburger. The Fusselman made a good showing on a drill-stem test in the Slick-Urschel and Plymouth 2 Alford well, which is near the top of the structure. In the diagonal northeast and southeast offsets to the 1 Alford, discovery well of field, no Fusselman tests could be made because of circulation troubles that started in the Pennsylvanian, above the Fusselman. Both wells are now Ellenburger producers.

The first well to be completed in the Fusselman was Republic Natural Gas Co. 1-E-A Barnett, SE NW Section 40, Block Y; and the second was Humble Oil & Refining Co. 1-B Barnett, NW NW Section 38. About midway east and west between these two wells, and to the north in Section 3, EL&RR Survey, Humble is now cleaning out 1 Parrott, an old dry hole, preparing to deepen it to test the Fusselman.

On the west side, Plymouth 1-48 Elliott, SE SE Section 48, Block Y, took an abbreviated drill-stem test of the Fusselman. The test had to be cut short because a strong wind started blowing the gas toward a near-



ANNUAL GULF COAST SECTION

THE OIL AND GAS JOURNAL

New Techniques ENABLE GULF COAST

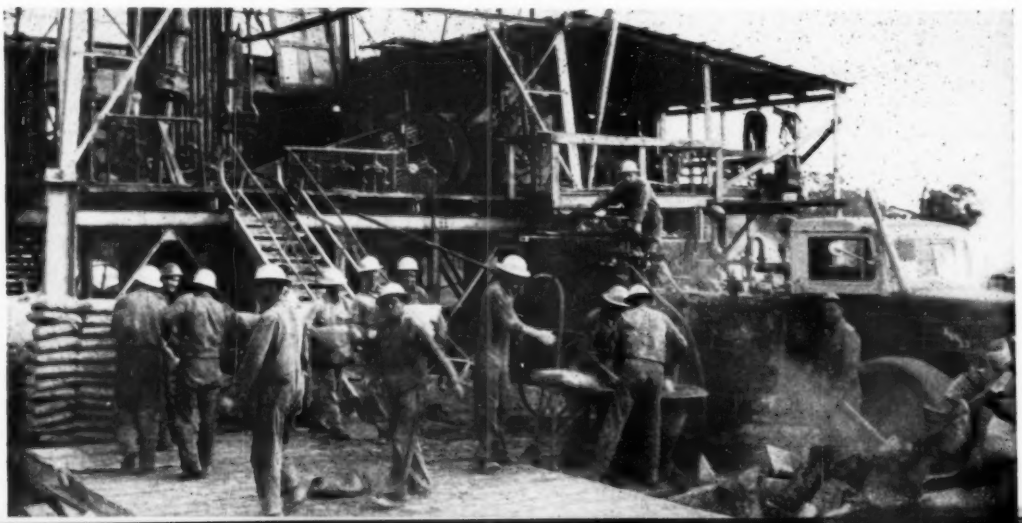
by Leigh S. McCaslin, Jr.

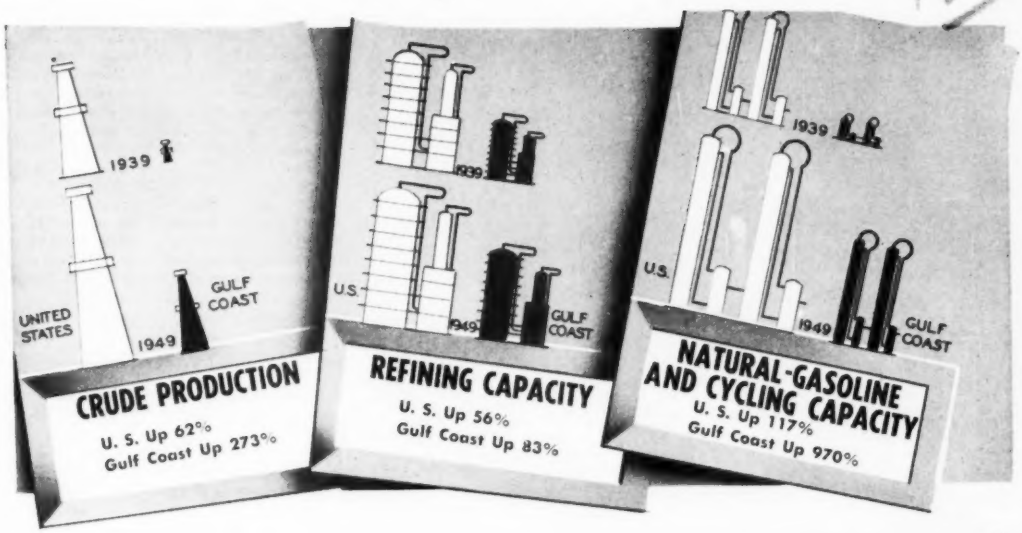
SUCH heretofore foreign things as weather forecasting, radar, L.S.T.'s, wave action, tides, marine design, and countless others were of great concern to Gulf Coast drilling men during the past year. These new problems were incident to **drilling in the unprotected waters of the Gulf of Mexico.** The L.S.T.-platform combination is currently the most widely used method. In the majority of cases the L.S.T. is towed to the drilling site, but Pure Oil Co. is using a self-propelled L.S.T. Several operators have stuck to using a platform with drilling equipment mounted thereon.

Two drilling platforms—the largest yet built (deck area of each approximates 1 acre)—are being fabricated for Superior Oil Co. of California. The feature of these structures is that they will be 100 per cent salvable.

Barnsdall Oil Co., Seaboard Oil Co., and Callery & Hurt (with Barnsdall

***CEMENTING TIME AT A GULF COAST DRILLING RIG.**—Deep drilling in many of the Gulf Coast areas necessitates "big" cementing jobs. This shot of drilling operations at Weeks Island, St. Mary's Parish, Louisiana, is at the busy period in the cementing operation*





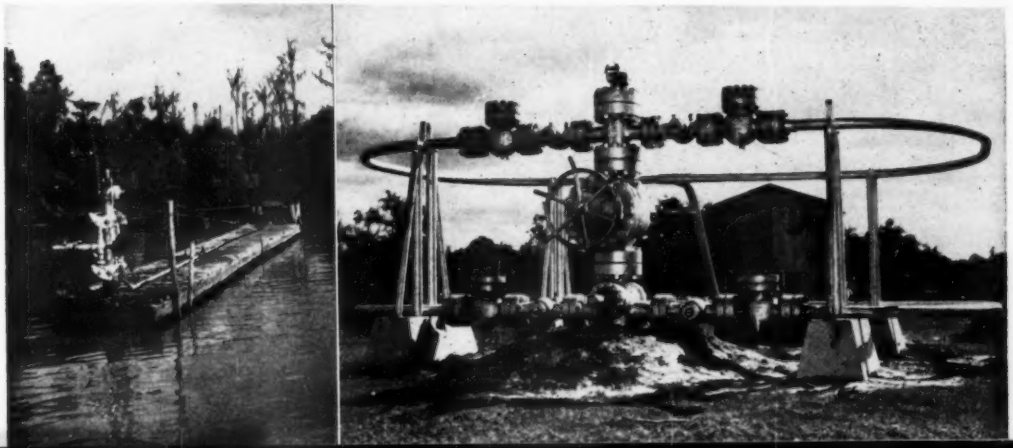
OPERATORS TO MEET *Increased Demands*

as designer and operator) recently put on location a new and radically different type of a structure—a "stabilized sea drill." The drilling equipment is supported by what might be described as a floating pile foundation. The piles are attached at their base to a large barge which, when flooded, causes the entire structure to sink to the ocean floor. Stability during flooding is provided by two large adjustable "outrigger" pontoons on each side of the structure. The structure weighs 1,120 tons and is designed for drilling to 16,000 ft.

Shell Oil Co., Inc., drilled a well off Louisiana using a barge designed for swamp and inland water drilling. This was accomplished by sinking war-surplus L.S.M.'s as breakwaters and providing a shell fill for the barge to rest upon. . .

A highly automatic test rig put in the field by Humble Oil & Refining Co. drew much comment. Most unusual feature of the rig is the remote-control pipe racker which allows the derrick man and a floor man to rack pipe from comfortable seated positions. Coupled with the remote-control pipe racker are remote-control power tongs which eliminate the manual handling of tongs. Twenty-

***HIGH-PRESSURE GULF COAST PRODUCING WELLS.**—Well shown in left photo, completely surrounded by water, is in the gray-moss country of southwestern Louisiana (Shell Oil Co., Inc., West Lake Verret, La.). Flow of oil and gas continues to a separator and "heater-treater" installation "on land." The right photo shows a dually completed injection well in Sheridan, Tex., gas field which receives dry gas from nearby Shell cycling plant. To store the gas until a market for it exists and to help repressure the field, the gas is injected under 4,200 psi. through lower arm of christmas tree to a producing formation 9,300 ft. deep, through upper arm to a formation 1,000 ft. farther down*



PIPE-LINE COATING AND WRAPPING is under way here on the main natural-gas transmission line paralleling the original main line of Tennessee Gas Transmission Co. Picture was made on Jonesboro, La., spread and is part of the 827 miles of loop line (24 to 31 in.) constructed in 1948. System stretches 1,365 miles from South Texas to West Virginia. In addition, construction during the year included 73 miles of 20-in. lateral line to Carthage field, four new compressor stations totaling 30,000 hp., expansion of existing compressor stations by 78,400 hp., meter stations, and other facilities, at an aggregate investment of $53,792,000. Total capacity of system was increased from 325,000 to 615,000 M.c.f.

odd other drilling improvements are being tested on this rig which Humble considers a "field laboratory" for new drilling equipment. They include: high-fluid-velocity bits, improved mud-mixing device, walking feedoff brake, automatic bit-weight control, air throttles, and hydraulic slips. Primary objectives of Humble engineers responsible for the test rig are to improve drilling safety, reduce the actual work of the crews, and to protect deep holes. . .

Meeting in Houston, drilling contractors emphasized costs during the **eighth annual meeting of the American Association of Oilwell Drilling Contractors.** Many of the contractors expressed alarm over what they described as continued low contract prices. Other important topics discussed at the 3-day meeting included: liability of the drilling contractor under the "hold harmless" clause of his contract with the operator, employe benefits, safety training, and increased operating efficiency. . .

More efficient power application in **mud-mixing equipment** became a reality during the year. A number of propeller or turbine-type mixers came on the market. One such mixer requires only a 10-hp. steam turbine for power contrasted with the conventional 100-150 hp. to run a slush pump for mud mixing. This mixer is somewhat similar to an outboard motor in appearance. Turbulence is generated by two propeller blades and vanes on the propeller shaft. It will provide a high rate of turbulence in all parts of a normal-sized mud pit. . .

Of interest to all was the formation of **Drilling Research, Inc.,** a nonprofit organization for research into drilling techniques and apparatus. Initial program is scheduled for a period of 3 years at an estimated cost of $750,000. Present membership consists of some 40 concerns and individuals. Dr. J. V. Pennington, with offices in Houston, is technical director of the institute. . . In the field of **directional drilling,** Magnolia Petroleum Co. attained the extremely high angle of 57½° in drilling a test into a salt dome some 35 miles out in the Gulf of Mexico from the mouth of the Atchafalaya River, Louisiana Coast.

On shore, The California Co. reached an angle of 51° in drilling a well near Vicksburg, Miss. . . In Loui-

NEW TANKER-LOADING FACILITIES.—A new concrete crude-oil loading dock completed this past year at Humble's Baytown refinery, largest in the nation. It will accommodate two of the largest tankers afloat, is 42 ft. wide by 400 ft. long. Four large storage tanks were erected on shore to service the new dock. Each tank has sufficient capacity to supply the entire load for one T-2 type tanker

TOM O'CONNOR PLANT NEAR REFUGIO, TEX.—Operated by Humble, natural-gas-processing capacity of this installation is 35,000 M.c.f. per day. Liquid production is rated at 26,000 gal. daily including L.P.G. Initial authorization for the plant's cost was for $3,000,000

siana, an **adjustable stabbing board** for running casing was perfected and put into field use. The board is powered by a 1-hp. electric motor and is quickly adjustable from the first girt upward for a distance of 25 ft. The derrick man can get into position to handle joints of from 10 to 40 ft. in length. . .

Automatic feed controls for drilling rigs were field tested by several companies. Purpose of the controls is to eliminate the human factor in maintaining constant weight on the bit. . . **Mud developments** include the increased use of red muds. . . Research continued on **lost circulation** problems.

Production

ATTENTION of many producing men in the Gulf Coast area this past year was focused on the problem of producing oil from distant offshore fields. Phillips Petroleum Co., Stanolind Oil & Gas Co., and Kerr-McGee Oil Industries, Inc., developed the **first oil field in the world out of sight of land.** The field is located on a 20,000-acre lease block lying in Louisiana coastal waters some 85 miles southwest of New Orleans. . . To date, **11 oil, distillate, or gas-producing areas** have been discovered in the Gulf of Mexico, despite the state-federal fight over the "tidelands."

Operators with interest in the offshore production are: Magnolia Petroleum Co., Humble Oil & Refining Co., Kerr-McGee Oil Industries, Inc., Phillips Petroleum Co., Stanolind Oil & Gas Co., Superior Oil Co., Barnsdall Oil Co., Seaboard Oil Co., Shell Oil Co., Inc., The California Co., and Callery & Hurt. Offshore oil is being barged to land at present, but forward-looking engineers have under consideration alternate production methods as more wells and more fields are brought in. . .

Last August 1, Old Ocean field of Brazoria and Matagorda counties on the Texas Gulf Coast began operation under a unit agreement, thus becoming the **largest voluntarily unitized oil and gas field in the United States.** Unit operator of the 17,500-bbl.-per-day field is J. S. Abercrombie Co. As part of the unit program, two of the largest central separation stations in the world were installed. The two stations together are handling daily 17,500 bbl. of oil and distillate and 350 M.c.f. of gas from 150 wells. . .

A Gulf Oil Corp. engineer in Houston added to the literature an interesting comparison of **gas lift and rod pumping** in the same field. . . **A hydraulic packer** which can be set with-

(Continued on page 317)

PRODUCTION RESEARCH LABORATORIES.—New unit for the Texas Co. is located in the city of Bellaire (Houston suburb), adjacent to the previously constructed geophysical research and geophysical shops. Designated for research pertaining to oil and gas production, investigations presently under way cover multiphase flow in porous media, capillary behavior, model studies of reservoir performance, phase behavior, well-logging techniques, and prevention of corrosion

Fig. 1—Map of Gulf Coast oil producing area, showing general outline of main belts of production, location of major fields (100 million barrels or more ultimate production), and major structural geological features

Gulf

by Charles J. Deegan

THIS article deals primarily with the Gulf Coast. One doesn't have to be a geologist or sedimentologist to understand at least the broad general things discussed here. Every oil man thinks about oil in the ground and that's good geology. The average Gulf Coast operator knows all about producing trends in the area and will find this story fits in with what he already knows.

But in addition to dealing with the Gulf Coast, the story covers some angles of the newest line of scientific attack on the problem of oil findings. There are some pretty smart people who think these same ideas will apply in part or in whole to oil finding problems in other areas. For example: Oklahoma (Anadarko and McAlester basins, Pennsylvanian deposition); Illinois and Ohio (the coal basins); Western Texas (Marathon basin Pennsylvanian); Western Pennsylvania (late Devonian and early Mississippian problems); California (Los Angeles basin); Venezuela (Maracaibo basin); East Indies (Tertiary geosyncline); and Burma (Tertiary trough).

From the article itself, the reader may hope to get a bird's-eye view of oil accumulations on the Gulf Coast, with the richest spots highlighted. He may also get some idea of what the leading research geologists and sedimentologists there are thinking about. He may or may not decide that these sedimentologists are turning up some highly promising leads; and that these leads seem to tie in pretty directly with why these oil fields are where they are. One may or may not decide that work along these lines might help in pinning down where oil fields ought to be in many other parts of the world.

IN this story when you read anything about specific oil fields, or production figures, you can take it that we are referring to an area in Texas that takes in Railroad Commission Districts 4, 2, and 3 (from west to east), and all that part of Louisiana south of the south line of Vernon, Rapides, and Avoyelles parishes. (See Fig. 1). This is the area where most of the drilling has been done, includes most of the oil production, and best of all, it makes it easy to

Coast Oil . . . . . .

WHY ARE THESE FIELDS WHERE THEY ARE?

give you some pretty accurate statistics.

Now let's take a look at the oil fields If you want to count them, you'll find that there are around 900 named oil fields in this belt of Texas and Louisiana around the Gulf of Mexico. As an oil province it started with Spindletop in 1901. It is generally credited with being the birthplace of some of the biggest oil companies in existence today: Humble Oil & Refining Co., The Texas Co., Gulf Oil Corp., Magnolia Petroleum Corp., just to name a few. It is also credited with making a few new millionaries within the past 10 years, so there still seems to be opportunities left.

Since 1901 and Spindletop, this area has produced (up to January 1, 1949) about 5.4 billion barrels of oil and has about 6.7 billion barrels of proven reserves. During 1948 it produced just a bit over a half-billion barrels. Table 1 gives a breakdown of this:

TABLE 1—GULF COAST OIL
(In millions of barrels)

Area—	1948 production	To 1/1/49 cumulative production	As of 1/1/49 est. proven reserves	As of 1/1/49 total oil found
Texas:				
R. R. Dist. 4	99	906	1,833	2,739
R. R. Dist. 2	65	518	937	1,455
R. R. Dist. 3	196	2,550	2,300	4,850
Southern Louisiana	146	1,414	1,610	3,024
Total Gulf Coast	506	5,388	6,680	12,068

The general trend of the oil fields is quite simple. As you look at the map you will see that they fall into belts that curve around parallel with the coast line. The reason the fields fall in these belts is due to the geology. For instance, let's oversimplify and exaggerate the geological conditions temporarily. Imagine a Gulf of Mexico a long time ago with a shore line away inland from the present coast line. The water is filling a bowl-shaped area. Now you have a sizable area of the United States land mass that is being constantly worn down and carried into the Gulf. The Ohio-Missouri-Mississippi river system, the Rio Grande, and a lot of others, are constantly pouring this eroded soil into the gulf. These and other rivers or their predecessors have been doing this same thing for a good many million years.

As this material was dumped into the gulf it began to fill up the bowl. Naturally the shallow water around the edges filled up first, and this pushed the shore line farther out into the gulf. You can see that as the shore line was pushed farther out in the water, the sediments the rivers were bringing down were laid down farther and farther away from the original shore line. So, you expect to find the oldest (or first) sediments away inland from the present shore. You would naturally expect

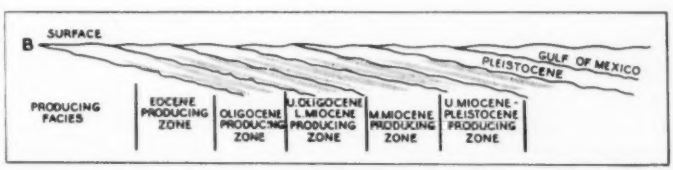


Fig. 2—Schematic diagram showing how geological formations dip from land outcrop toward and under the water. Eocene is oldest formation, Pleistocene is the youngest. Shaded area represents zone of oil production

also to find that the next oldest layer would be a little closer to the present shore line, but still quite a ways inland, and so on, until you came to the present shore line. Just beyond that you would expect to find that a layer is being deposited right now from the material being brought in every day by the rivers.

In general that is just about what we do find. The older sediments outcrop on the surface if you go far enough inland; the oldest the farthest inland; then the next oldest, etc., etc. From the wells drilled, we know also that as any particular layer is followed from its inland outcrop down toward the present gulf, it gets thicker and thicker. That is what you expect if you poured finely ground material down over the edges of a shallow sloping bowl. It would form a wedge with the thin side on the upper lip of the bowl and the thickest part at the bottom of the bowl.

Now for reasons that we don't understand at present, conditions seemed to be just right for making and accumulating oil in these formations only at a certain zone in these layers of sediments. (See Fig. 2). Basically the thing the sedimentologists are trying to find out is why conditions were just right in this zone; what these conditions were; and how to tell where those conditions will exist in other places. If they succeed, we'll know a lot more about where to hunt for oil, not only in the Gulf Coast, but in a lot of other parts of the world, too.

This favorable zone for oil is generally at an intermediate point between the surface outcrop and the thickest part of any layer out under the present gulf. Since the outcrop of the oldest layer of sediments is the farthest inland, you are not surprised then to find the oil-zone belt that is farthest inland is producing from the oldest sediments. The next oldest layer of sediments outcrops a little closer to the present shore line, and sure enough, the belt of oil production from this layer falls in a zone that is a little closer to the present shore line. This idea works out so well that Gulf Coast oil men have a pretty good idea of what formations are going to produce in the offshore work.

If you take a map of the present shore line and draw a sweeping smooth curve from the west to the east, cutting across Louisiana, you find you have cut off a sizable chunk of land in Louisiana that sticks out into the gulf. A closer look and you are not surprised when the geologist says that is simply a big delta built up by the Mississippi River. When you get a little way beneath that swampy land mass you are drilling in the same kind of formations that lie under the waters of the gulf to the west and east. So, from the kind of oil fields found underneath this delta, you have a pretty good idea of the kind of fields you are going to find in the offshore drilling.

In general, there will probably be another belt or two of oil fields out in the water, but paralleling the shore line and also paralleling in a general way the oil-field belts along the land. Oil men in general, and Gulf Coast oil men in particular, know that it isn't going to be quite as simple as this sounds. They know there are going to be quite a few hundred million dollars spent, a lot of disappointments, and certainly some people will lose a lot of money, before that belt is filled in with oil fields. But, if oil men are given a chance to make the gamble on reasonable terms, eventually that belt or belts will exist.

As part of the trend of the times among oil men, the results of past operations are being studied to see what can be learned from experience to do a better and a cheaper job in the future. You can readily see that offshore drilling and operating are going to be a lot more expensive than similar operations on land. Executives and engineers are working night and day to figure out ways and means of drilling and operating that will not be as costly as the first offshore work. But the odds are that no matter how many ingenious developments they come up with, such costs will still be higher than operations on land.

That puts a big burden on the exploration men. It is up to them to try to cut oil-finding costs sharply by improving their oil-finding tools and methods. If you can cut your finding costs per barrel, you can partly offset your increased development and operating costs. What are the prospects of cutting oil-finding costs? At this stage, about all you can say is that we have some promising leads.

For instance, we said that there are about 900 oil fields producing along the coast. But when you break them down, you will find that 24 of these fields, or less than 3 per cent of the total number, accounted for 40 per

(Continued on page 326)

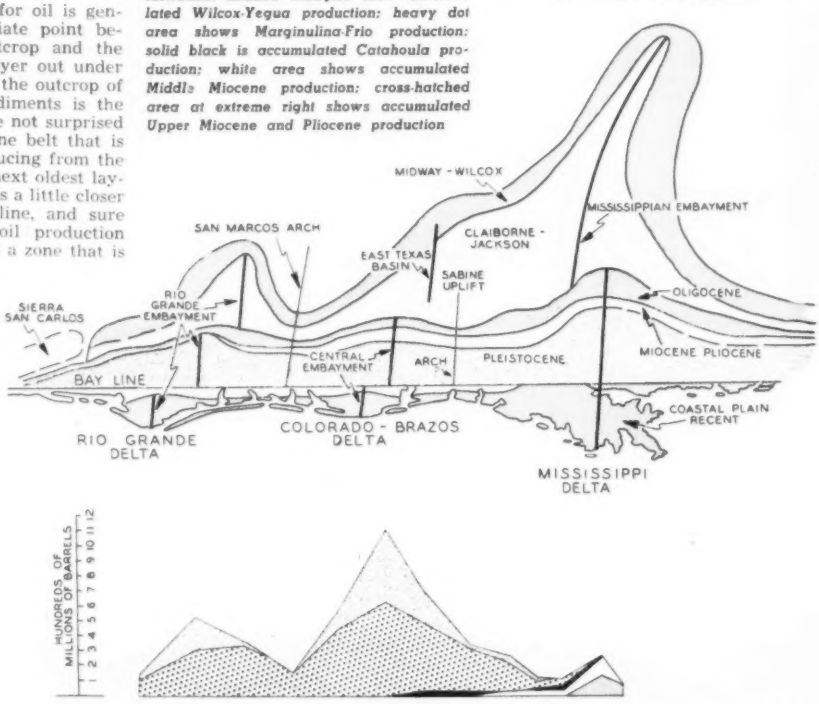
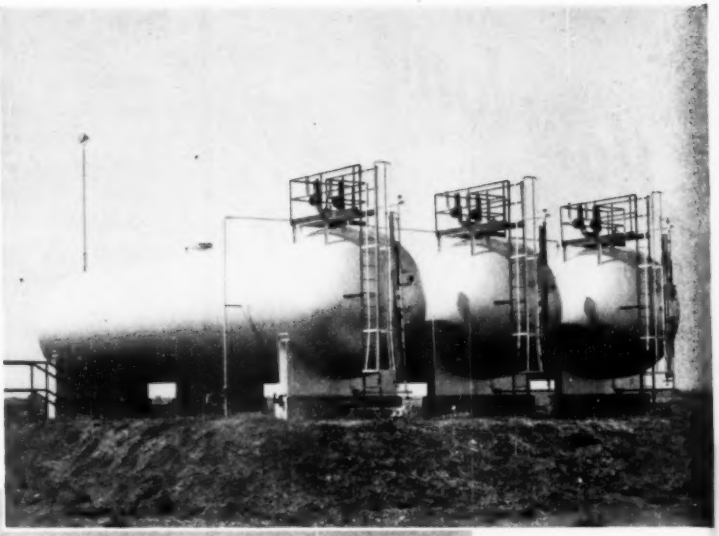
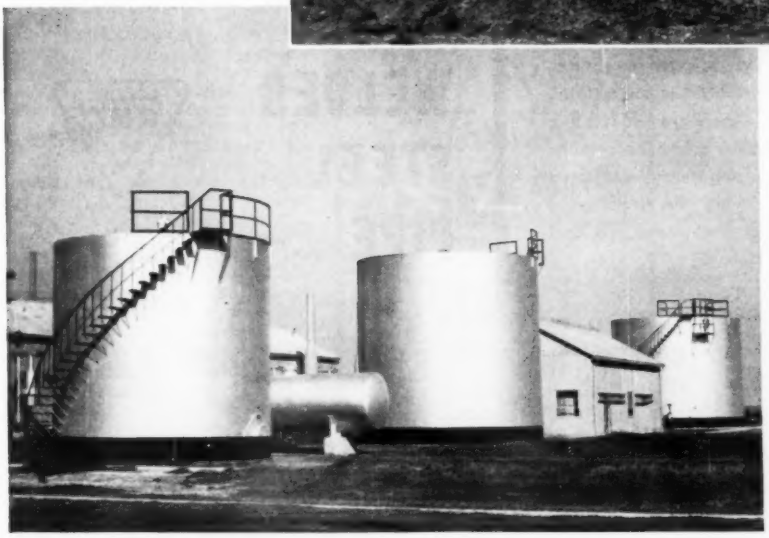


Fig. 3—Upper illustration shows Gulf Coast area as it would look if straightened out on a base line drawn at the land end of the larger bodies of water that indent the coast line. Lines showing axes of Rio Grande Embayment, San Marcos Arch, Central Embayment, and Mississippian Embayment are broken to show where they were probably located at different geological periods. Bottom illustration shows accumulated oil production from different geological formations. Height of top line shows how much oil has been produced in the geographic area immediately above it in the upper illustration. Shaded triangles show accumulated Wilcox-Yegua production: heavy dot area shows Marginulina-Frio production: solid black is accumulated Catahoula production: white area shows accumulated Middle Miocene production: cross-hatched area at extreme right shows accumulated Upper Miocene and Pliocene production

Good things come in threes





Above: Three 12-ft. diam. by 62-ft. horizontal pressure vessels used to store butane at 80 lbs. per sq. in. pressure, at the Humble Oil & Refining Company's plant at Anahuac, Texas. Left: 1,000-bbl. absorption oil tank, 2,000-bbl. water tank, and 3,000-bbl. raw water tank at the same plant.

The butane storage tanks shown above are one of the types of Horton pressure vessels used throughout the oil industry. Cylindrical tanks with ellipsoidal or hemispherical heads and spherical and spheroidal containers (Hortonspheres and Hortonspheroids) offer the petroleum engineer a complete range of storage capacities (1,000 to 120,000 bbls.) and pressures ranges (2½ to 250 lbs. per sq. in.).

The three butane tanks at Anahuac were built in our Birmingham plant and shipped complete, while the three flat-bottom tanks were field-erected on the site by one of our own experienced crews. Butt-welded construction was used for all six.

When you need storage facilities, send your specifications to our nearest office and ask for estimating figures.

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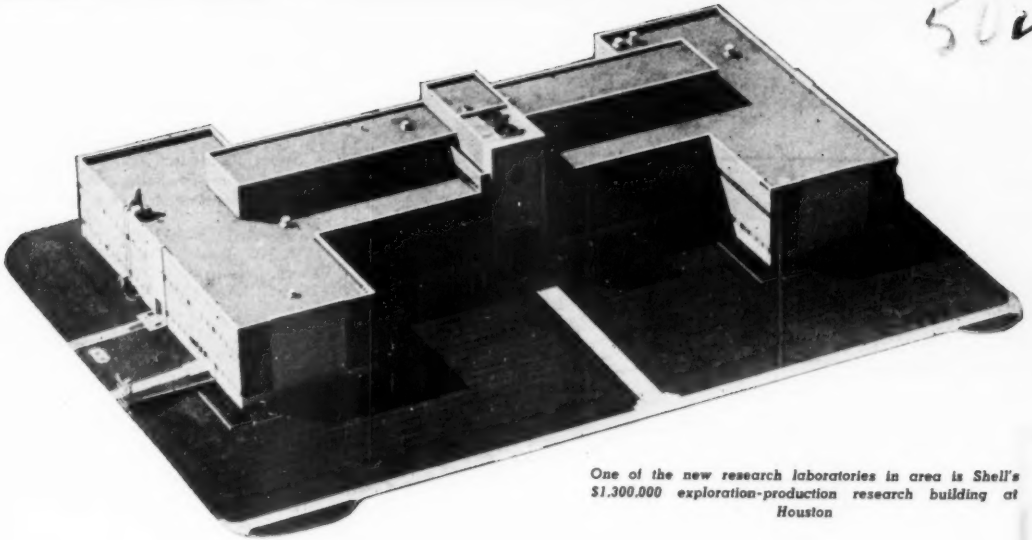


One of the new research laboratories in area is Shell's $1,300,000 exploration-production research building at Houston

Gulf Coast RESEARCH FRONT

Shows Increasing Expansion in Activities

by E. N. Kemler*

THE petroleum industry utilizes research and technology more intensely than any other industrial group. The outstanding developments which have taken place in this industry have been due to the intensive research activities of the individual companies and their extensive utilization of technologists in their manifold operations. A quick glance at new refining practices, an inspection of a modern geophysical unit, the operation of a modern drilling rig, or the review of methods of analysis of reservoir performance is sufficient to show the intricate and complex nature of all phases of the industry's operation. The current methods represent almost unbelievable paradoxical examples of attainment in efficiency, ruggedness, precision, simplicity, and economy.

The nature of many of the research activities in the petroleum industry results in their current development not reaching the public's attention immediately. Because of the commercial aspects, a considerable time period elapses after the discoveries and developments take place. For this reason, it is difficult to recount a list of research accomplishments during any particular period of time. Most of the developments which are reported represent activities extending over several years' time and public announcement is made only when the stage of commercial maturity has been reached. The many developments which have been publicly announced during the last year are, however, an index of the general research activity which has taken place.

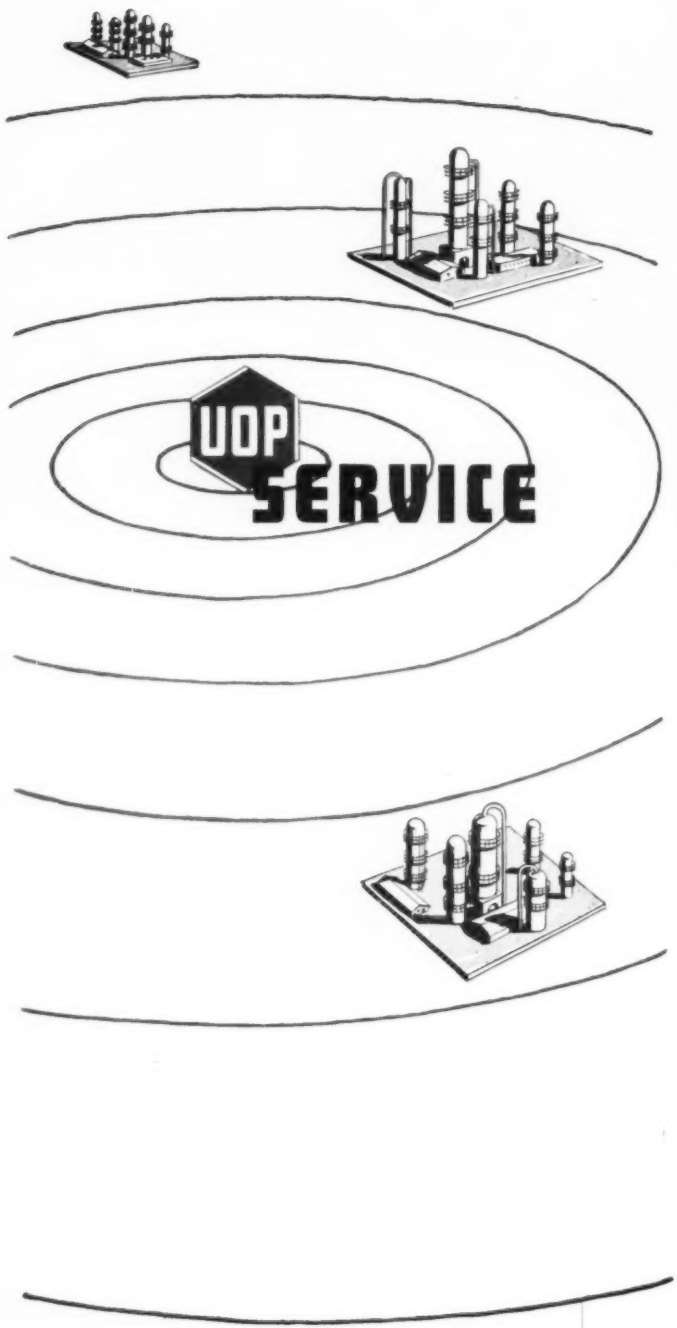
The industry's policy of bringing in research to develop methods of transforming crude to meet the market's requirement rather than trying to force the public to utilize what it is convenient to furnish, is the key to the growing demand for the industry's products. The technology of reforming hydrocarbons has been brought about as a result of research activities over several decades. It is not something which has come about as a result of a single flash of genius but rather through the concerted long-time efforts of technologists and scientists in the many fields of the physical sciences.

The continued demands for products to fit narrower specifications has

(Continued on page 331)

*Associate director, Southwest Research Institute, Houston.

Sun Oil Co. is another company that has a new Gulf Coast laboratory



Farmers Union Capacity Up Four Times Over 1930

By C. A. Cromwell
Superintendent, Farmers Union Central Exchange, Inc., Independent Refining Div.

In 18 years of existence, the crude capacity of our refinery at Laurel, Mont., has been increased four-fold. Today it is in excess of 10,000 b/d; the result of a continuous program of modernization and improvement that has been pointed toward increased efficiency and product quality as well as expanded capacity.

C. A. Cromwell

The refinery was built in 1930 by Laurel Oil & Refining Co. to operate on Oregon Basin, Wyo., crude. It consisted of a simple crude unit, a Donnelley cracking unit and coking drums for producing coke from cracked residuum to supply the fuel needs of nearby industrial plants. Soon additional stills were installed to increase coke production.

In 1935, Independent Refining Co., then operating the refinery, recognized the need for increased capacity and improved efficiency and called upon Universal Oil Products Co. for a survey of the plant, its operations and markets. As a result of this survey, extensive changes were undertaken.

Converted to Thermal Cracking

The crude unit was revamped to boost capacity, a new vacuum unit was added to produce asphalt and a Gray clay-treating tower was installed. The Donnelley cracker was converted to embody the principles of the single coil UOP thermal cracking unit design, using existing equipment as far as possible. A forged steel reaction chamber was installed. New equipment included a flash chamber, fractionating tower, stabilizer, absorber, residuum cooler and condenser coils. Alloy steel was used in all hot lines.

The cracking facilities were designed by UOP and provision was made for later conversion to 2-coil operation. The new facilities went into operation in 1936.

In 1938 the conversion was made. A new UOP updraft heater was installed for heavy oil and the existing heater was adapted to light oil service. These changes increased the capacity of the cracking unit to about 2,500 b/d.

Polymerization Added

To recover valuable hydrocarbons from the cracked gas, a UOP catalytic polymerization unit was installed in

(Advertisement)

1941. This was designed to produce 70 b/d of polymer gasoline. The high sulfur content of the stocks necessitated extensive pretreating equipment for the poly unit feed, including a TPP unit for H_2S removal, caustic prewash and regenerative caustic wash.

As the capacity of the refinery grew, demand for additional steam became imperative. An economizer, installed in the breeching above the convection section of the heavy oil heater upon UOP's recommendation, provided the equivalent of adding 100 hp to our plant and made the purchase of a new boiler unnecessary.

In 1942, a new cracking plant stabilizer was installed and the heavy hot oil pump was replaced by a new centrifugal pump. Later, the old stabilizer was adapted to remove H_2S and propane from straight run gasoline. The revamped plant went into operation in 1943.

Acquired in 1943

It was in that same year that we acquired the refinery. Being in accord with the expansion and modernization program, we continued to work with UOP and planned extensive revamping of the thermal cracker.

Part of this work was finished in 1945, including the installation of a new UOP upshot heavy oil heater and a fractionating tower, alloy lined. The heater previously used for heavy oil was placed in light oil service and a new centrifugal light oil pump was installed. The program was completed in 1946 with the installation of a new alloy-lined flash chamber and a second reaction chamber to operate in series with chamber No. 1. The existing chamber was adapted to use as a residuum stripper.

This raised the cracking capacity of the cracker to about 6,000 b/d and gave us considerable flexibility. The unit is able to crack topped crude or to charge crude directly to the fractionating tower. Straight run gasoline can also be charged as reflux to the fractionating tower. In these latter two operations the straight run gasoline is depropanized and H_2S is also removed. This type of operation increased butane recovery which in turn increases yield and octane rating of the combined gasoline.

At the same time the capacity of the poly unit has doubled to take care of the increased amount of gas produced in the cracker.

Universal has rendered valuable service through the years, recommending and designing all thermal cracking plant and poly plant equipment, and assisting in revamping other refining facilities which did not pertain to their licensed processes. In addition, we have depended to a considerable extent upon the results of work done in UOP's Riverside laboratories, such as analyses of crudes, yield breakups, etc.

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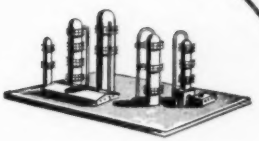

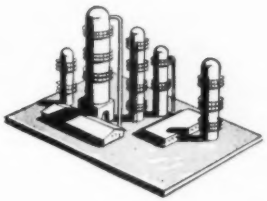

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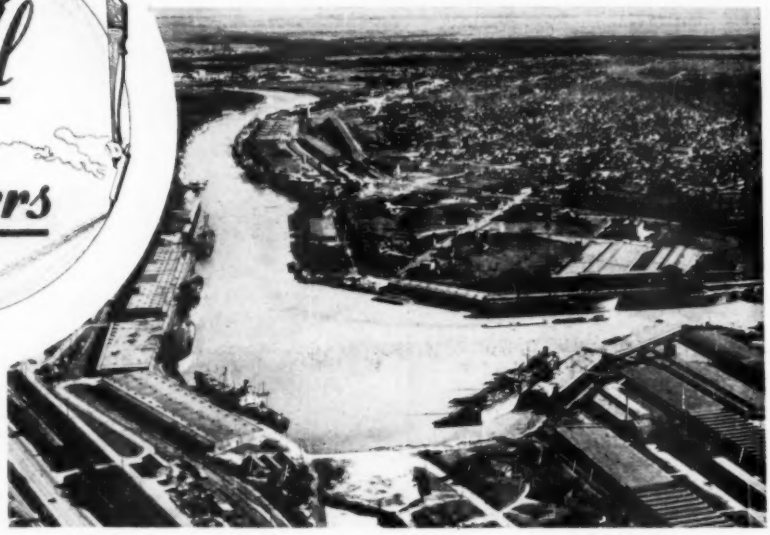
GULF COAST Oil Centers

This is a word-and-picture account in highlight form of some of the "oil cities" in the busy, oil-rich Gulf Coast drilling-producing-refining territory. A great deal could be said about the spectacular growth of any of these Gulf Coast oil cities, and the list given here includes for space reasons only the larger centers. In the cities picturized on these pages one will find heavy concentrations of operators and companies in the engineering-construction-operating phases of all divisions of the oil and gas industries.



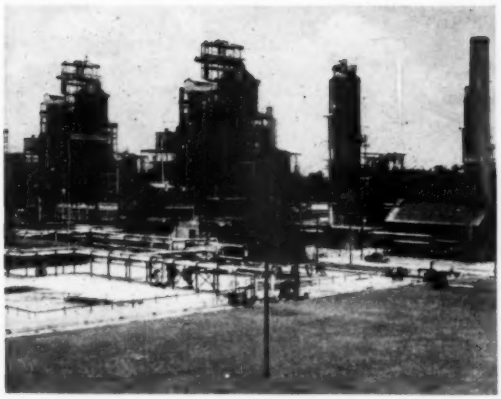
HOUSTON. View of Ship Channel Turning Basin. In the past 10 years the number of manufacturing plants in the city has doubled; industrial employment has trebled; consumption of nonresidential electric power has trebled; consumption of nonresidential natural gas has quadrupled. The value of industrial products has increased 600 per cent, as have wages paid in manufacturing. There are more than 100 oil fields and nearly 7,000 oil wells in 14 counties in the Houston territory, 18 natural-gasoline and cycling plants (about 10 per cent of United States' output), 15 refineries with processing capacity of 609,000 bbl. daily (about 40 per cent of Texas and 11 per cent of the United States). Thirteen ocean-going vessels can be seen loading and discharging cargo in this aerial view. Along the basin and channel are industries valued at more than $600,000,000, including petroleum refineries, chemical plants, oil-tool companies, and many others. The Turning Basin lies 4 miles within the city limits of Houston and the 34-ft. deep Ship Channel extends for 50 miles; the huge industrial area is expanding rapidly along the Ship Channel. Houston is also the focal point of a huge new chemical empire rising along the Texas Gulf Coast where more than $300,000,000 is being invested in postwar chemical plant expansions

PORT ARTHUR. This refining center of 90,000 population has for its slogan, "We Oil the World." Industries include plants of Gulf Oil Corp. (refinery has 230,000 bbl. daily capacity, employs 5,500 persons); The Texas Co. (refinery, capacity 190,000 bbl. per day, employs 5,500 persons); Atlantic Refining Co. (capacity 40,000 bbl., employs 300). Shipping, ship building, and the manufacture of chemicals, in addition to oil refining, form vast reservoirs of employment for the residents of this growing coastal city. A deep-water canal to the gulf, skirting the western end of Lake Sabine, provides the vital link of shipping from Port Arthur to the gulf which paved the way for industrial development of the city

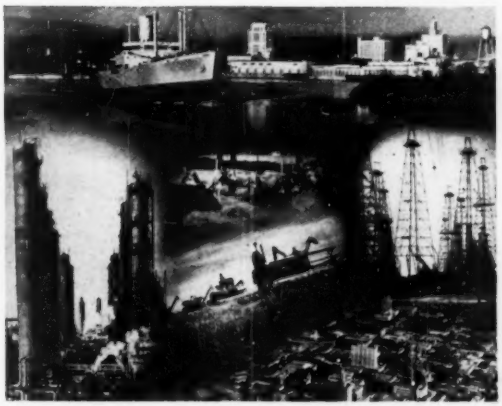
CORPUS CHRISTI (Opposite page, bottom)

Oil is big business in this area. Within 5 minutes' to 3 hours' ride there are 329 oil fields, their 13,000 wells currently producing more than 450,000 bbl. of oil per day. A large volume of crude oil is refined by Corpus Christi plants, and the territory is one of the country's most important for recycling and repressuring operations. And oil is the important commodity at the port of Corpus Christi. The Navigation District owns, maintains, and operates five oil docks in the main harbor and in the Avery Point Harbor, and there are several private docks. Tank farms along the two turning basins and industrial canal store over 12,000,000 bbl. of oil. Photograph at extreme right shows an aerial view of Celanese Corp.'s plant (Bishop, Tex.) near Corpus Christi

50 V



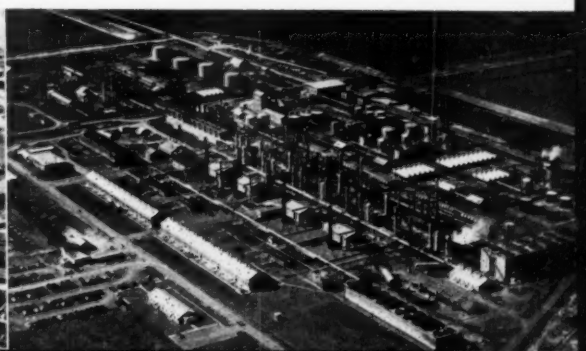
LAKE CHARLES. In this coastal oil region there are 45 producing fields, and two refineries are located on the Calcasieu Ship Channel (Continental Oil Co. with a capacity of 12,000 bbl., and Cities Service Refining Corp., 10 miles downstream, capacity 120,000 bbl.) The ship channel is 33 miles long, and runs to Gulf of Mexico. Depth is 35 ft., bottom width 250 ft. Port is controlled by a dock board which has supervision over Lake Charles Harbor & Terminal District. Picture above is general view of Cities Service refinery near Lake Charles



BEAUMONT. This city of 100,000 has had its share of the glory and wealth of oil since the Spindletop discovery in 1901. It is often considered part of an industrial triangle, along with Port Arthur and Orange. It ranks among the first six or eight ports in the nation, largely as a result of oil shipments. At nearby Winnie, Glenn H. McCarthy has built a $4,500,000 gas-absorption plant, later enlarged it as the McCarthy Chemical Plant. Magnolia Petroleum Co. is completing construction of new units for lube-oil production

ORANGE. Here are located the DuPont Sabine River petrochemical works; Continental Steel Corp. (U. S. Steel subsidiary—steel fabrication plant, refinery equipment, shipbuilding, etc., with 1,000 employes); Levingston Shipbuilding Co. (marine industrial construction, 850 employes), and 12 other manufacturing concerns. The above aerial photo shows in foreground part of the facilities of Levingston Shipbuilding Co., with Consolidated Shipbuilding Co. in background. Peak population during World War II rose to estimated 60,500

NEW ORLEANS. The "International City" of the South is an oil center which has particular emphasis for southern Louisiana and activities in offshore drilling along the eastern belt of the Gulf of Mexico. Southern Louisiana may have an unprecedented increase in production as results of this new exploration begin to show up. Estimates have placed potential reserves of the Continental Shelf at several billion barrels. View above is of the direct center of the Crescent City, looking down on famed Canal Street

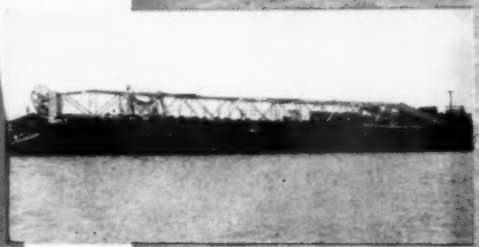


LEE C. Moore Specialized

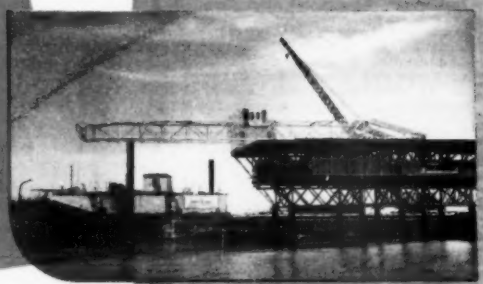
1. Lee C. Moore "Jackknife" Cantilever Masts being placed on trucks from assembly point on beach.

2. Mast has been rolled to dock ready to be pulled on sea-going barge.

3. Mast in one section, being placed on barge for its trip to location.



4. The mast is now ready for its trip to foundation which has been constructed far from shore.



5. Mast is now placed on sub-structure prior to being raised.

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FOR DEEP WATER DRILLING...

Experienced engineering is needed for the specialized field of deep water drilling. These pictures show how Lee C. Moore structures are meeting this challenge. Lee C. Moore masts, derricks and sub-structures have proved their value in actual operation on deep water locations.

6. Mast is secured in place and rigged for operation.

7. Drilling operations are under way: pipe in rack. Mast will stand an indicated wind load of 70 MPH.

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Just what the doctor ordered . . . *red painted* International oil-pump engines keep balance sheets healthy by boosting production and guarding costs. They deliver their full-rated horsepower on every job and carry on over the years with minimum maintenance when correctly coupled to pump jacks or other pumping mechanisms. • Their controlled combustion system, positive ignition, sensitive speed-governing, efficient lubricating methods and overall rugged construction account for their superior performance and long-lived stamina. • Since reliable, economical power is "good medicine" for your business, it will pay you to contact your International Power Unit Dealer and get International multiple-cylinder engines on your pumps now.

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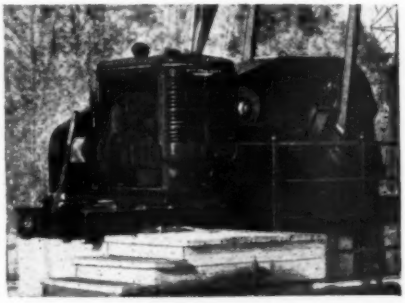

Big Producer! This International U-6 puts plenty of lift into this pumping job on a deep well in Texas. With five sizes of carbureted power units in the line, you'll find an International that completely satisfies your oil-field pumping needs.

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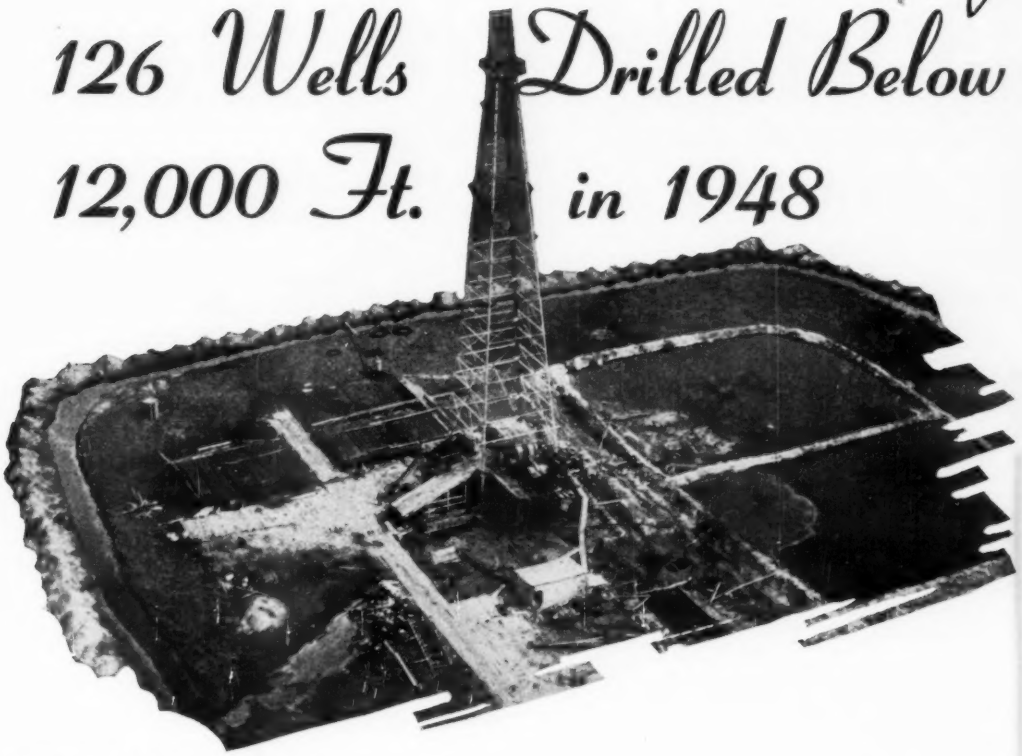
126 Wells Drilled Below 12,000 Ft. in 1948



Deepest producer in Texas currently is Humble Oil & Refining Co. 1 South Mays Gas Unit 1, Chambers County, producing from 12,021-26 ft. Test was completed in February 1948 with initial production of 134.4 bbl. of condensate and 1,344 M.c.f. of gas daily through ½-in. choke. Drilling time was 161 days—84.5 days by drilling and round trips and 23 days for coring

IN TEXAS-LOUISIANA COASTAL AREA

by Essie Mae Abbott

THERE were 126 wells drilled below 12,000 ft. in the Texas-Louisiana coastal area during 1948—a 60 per cent increase over 1947 when only 79 such wells were put down (see Table 2). Thus, although not currently holding the record for the world's deepest well, the Gulf Coast area remains the leader in scope of deep drilling.

Deepest well during the past year was drilled by The Texas Co. in Queen Bess Island field, Jefferson Parish, Louisiana. (See Table 1.) It was the 4 State-Barataria Bay which was abandoned in August of last year after reaching a total depth of 16,106 ft. Second-place honors go to Humble Oil & Refining Co. for its 2 J. R. Williams, a wildcat in Washington County, Alabama. This test went to 15,659 ft. before being abandoned in February of this year.

A great majority of the deep wells continue to be drilled in the Louisiana coastal region. To date, 303 wells below 12,000 ft. have been drilled in the Pelican State. (See Table 4.) This compares with 73 for the Texas Gulf Coast area, 14 for Mississippi, 9 for Florida, and 3 for Alabama. This trend is continuing at present. So far in 1949 (up to April 20), 26 deep tests have been completed in Louisiana as contrasted with only 4 in Texas.

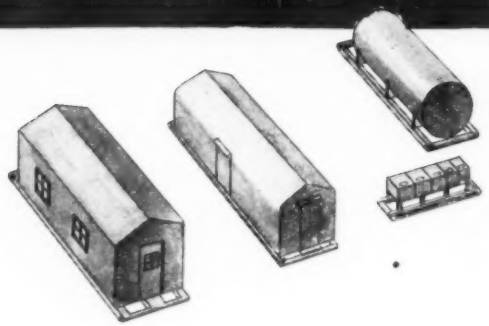
Phillips Petroleum Co. still holds the all-time record for the deepest well drilled in the area. The record holder is the 3 Fannie Schoeppe, located on the Millican dome in Brazos County, Texas. It was drilled in 1944 and reached 16,655 ft. before abandonment.

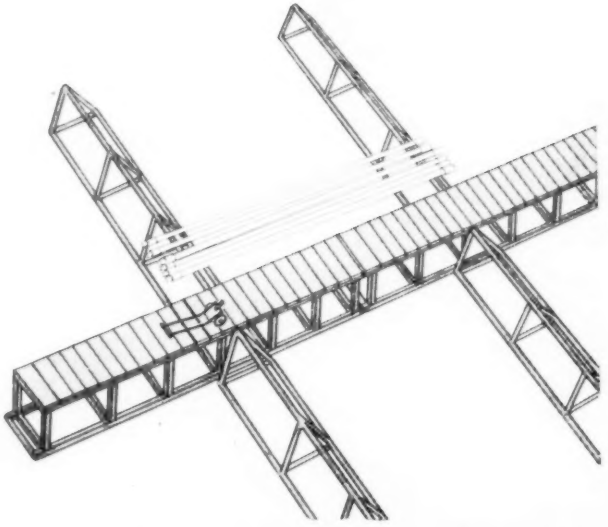
Deepest production in the Gulf Coast is found in Weeks Island field of Iberia Parish, Louisiana. (See Table 3.) Shell Oil Co., Inc., just this past November completed an oil producer in the field with a total depth of 15,094 ft. and production from 14,243 ft. Shell has completed three Weeks Island oil producers in zones below 14,000 ft. during the past year. The Texas Co. is the only other operator thus far to find production below 14,000 ft. in the Gulf Coast. This well, too, was drilled during the past year and is the 111 LLE-Leeville in the Leeville field of Lafourche Parish, Louisiana. It reached a total depth of 14,473 ft. and is producing from 14,075 ft.

Eighteen fields, to date, have found production below 12,000 ft. in the Gulf Coast. Fifteen of these fields are in Louisiana, two in Texas, and one in Mississippi. (See Table 3.) Weeks Island field leads the list with 11 wells below 12,000 ft. as of January 1, 1949.

Much research work, many reports, and considerable thought by engineers and geologists were focused on the problem of deep drilling this past year. In a paper presented before the American Association of Petroleum Geologists, Olin G. Bell, Humble Oil & Refining Co., and coauthors predicted that the economic limit of deep

GMC SPECIALIZES IN ROTARY RIG SPECIALTIES





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- Mud Tanks
- Tool Boxes
- Work Benches
- Mud Box
- Pipe Mat
- Loading Ramp
- Engine Shed and Wind Breakers
- Pipe Racks, Walkways and Slide Ramps
- Casing Wagon
- Guards—Belt and Chain
- Unitized Pump and Engine
- Skids
- Substructures, Walkways, Handrails and Steps
- Mud Troughs with Walkways and Chemical Tanks
- Utility Units

ITEMS AVAILABLE BUT NOT SHOWN

- Engine and Pump Compounds
- Pump Suction Cleaner—Jet Type
- Turbo Jet Mud Guns
- Wire Line Guides
- Core Reels
- Connection Racks
- Back Up Posts
- Mud Hoppers
- Monkey Boards
- Repairs to All Rig Equipment

In this rig layout drawing are shown the typical rotary rig specialties that we regularly manufacture to specification for some of the oil industry's largest drilling contractors.

Specialties that GMC manufactures and fabricates are listed above and shaded in the drawing.

We are prepared *now* to build any piece of equipment shown here . . . or any other rotary rig specialty you might need . . . to your specifications, incorporating any specifically desired features.

If you prefer, GMC engineers will gladly assist in working out details of your equipment design. At no additional cost, we will paint your equipment to your standard colors.

GMC ROTARY RIG SPECIALTIES Are Available Through Your Supply Outlet

You name it... and we'll make it to your specifications

In addition to manufacturing rotary rig specialties, we are equipped to handle major rig overhaul jobs.

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UNIBOLT *Flow Manifolds*

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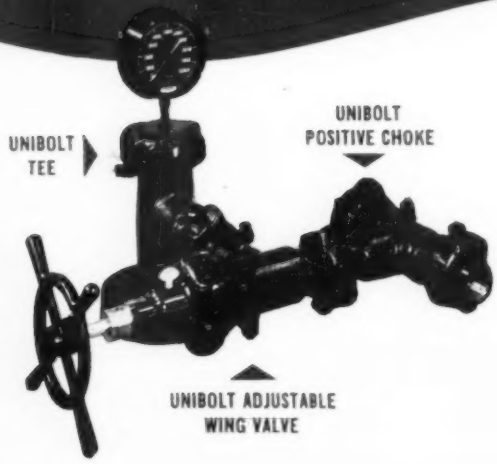


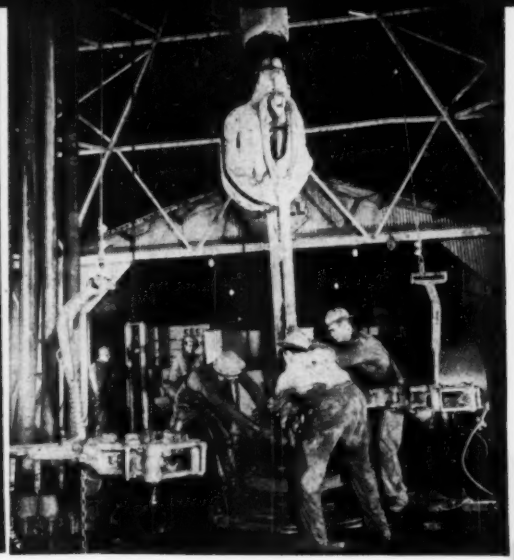
Here's another reason why UNIBOLT Flow Manifolds are preferred by many production men: the units of this manifold—Unibolt Adjustable Wing Valve, Unibolt Positive Choke Body, and Unibolt Tee, or Cross—may be assembled in a number of combinations to best meet individual requirements . . . a Unibolt Tee, or Cross, with either one or two Adjustable Wing Valves, and with either one or two Choke Bodies. The Wing Valves can be arranged for flowing with or against the stem, and the Positive Choke Body may be rotated to any desired position to facilitate tying-in with the flowline. It's truly flexible.

Add to this such features as: lighter weight, greater strength, lower first cost and maintenance, plus the fact that any of its parts may be safely and easily replaced in the field, and you have the reason why more and more operators are specifying UNIBOLT Flow Manifolds.

Available in regular forged steel or in high-chrome alloy for corrosive wellls—6,000, 10,000 and 15,000 lb. test.

THORNHILL-CRAVER COMPANY

Houston, UNIBOLT THE ONE BOLT COUPLING **Texas**



Left: This steam rig is described by Shell Oil Co., Inc., as the largest and most powerful steam drilling rig ever assembled. It is drilling in Weeks Island field of Louisiana where the deepest production on the Gulf Coast is found. Derrick towers 225 ft., and the barge, fully loaded, weighs nearly 2 million pounds. Right: This dramatic night shot of a drilling crew in action was made on a Shell rig in Weeks Island field, where Shell has completed three oil producers in zones below 14,000 ft. during the past year

Table 1—Gulf Coast Wells Drilled Below 13,000 Ft.

Company, well and location—	Total depth (ft.)	Date completed, status
16,000-Ft. Wells		
Phillips Petroleum Co. 3 Fannie Schoeppe, Millican, Brazos County, Texas	16,655	July 1944, Abandoned
The Texas Co. 4 State-Barataria Bay, Queen Bess Island, Jefferson Parish, Louisiana	16,106	August 1948, Abandoned
The Texas Co. 6 Yturria L. & L. Co., Raymondville, Willacy County, Texas	16,006	April 1947, Abandoned
15,000-16,000-Ft. Wells		
Superior Oil Co. of Calif. 1 Casie Bradford, Wildcat, Forrest County, Mississippi	15,730	May 1947, Abandoned
Humble Oil & Refining Co. 2 J. R. Williams, Wildcat, Washington County, Alabama	15,659	February 1949, Abandoned
The Texas Co. 1 State Lease 646, Queen Bess Island, Jefferson Parish, Louisiana	15,604	September 1948, Abandoned
The Texas Co. 6 State-Atchafalaya Bay, Belle Isle, St. Mary Parish, Louisiana	15,549	February 1948, Abandoned
The Texas Co. 13-2 State-Lake Pelto, Lake Pelto, Terrebonne Parish, Louisiana	15,543	December 1948, Abandoned
The Texas Co. 1 Lafourche Basin Levee Dist., Queen Bess Island, Jefferson Parish, Louisiana (comp. at 13,904 ft.)	15,523	July 1947, Gas-condensate
Humble Oil & Refg. Co. 10 E. F. Milo, Tomball, Harris County, Texas (comp. at 5,600 ft.)	15,452	December 1945, Oil producer
Quintana Petroleum Co. 3-D South Texas Syndicate, Wildcat, McMullen County, Texas	15,301	February 1945, Abandoned
Gulf Refining Co. 1 State, Wildcat, Monroe County, Florida	15,155	April 1947, Abandoned
Humble Oil & Refining Co. 2 Cote Blanche-Coffee Fee, Cote Blanche area, St. Mary Parish, La.	15,140	July 1947, Abandoned
Shell Oil Co., Inc., A-1 J. A. Smith, Weeks Island, Iberia Parish, Louisiana (comp. at 14,243 ft.)	15,094	November 1948, Oil producer
The Texas Co. 1 State Lease 919-Leeville, Wildcat, Leeville Area, Lafourche Parish, Louisiana	15,003	February 1949, Abandoned
Shell Oil Co., Inc., 4 Smith-State Unit "B," Weeks Island, Iberia Parish, Louisiana	14,900	March 1949, Oil producer
Shell Oil Co., Inc., B-2 Smith-State Unit, Weeks Island, Iberia Parish, Louisiana (comp., 14,015 ft).	14,704	June 1948, Oil producer
13,000-15,000-Ft. Wells		
The Texas Co. 2 State-Barataria Bay, Queen Bess Island, Jefferson Parish, Louisiana	14,577	September 1946, Abandoned
Humble Oil & Refining Co. 1 State-Calcasieu Lake, Calcasieu Lake, Cameron Parish, Louisiana	14,553	January 1948, Abandoned
The Texas Co. 1 State-Barataria Bay, Queen Bess Island, Plaquemines Parish, Louisiana (comp. at 11,407 ft.)	14,490	December 1945, Gas-condensate
The Texas Co. 111 LLE-Leeville, Leeville, Lafourche Parish, Louisiana (comp. at 14,075 ft.)	14,473	July 1948, Oil producer
Humble Oil & Refining Co. 4-B J. M. Burguieres Co., Ltd., Weeks Island, Iberia Parish, Louisiana	14,470	December 1948, Abandoned
Humble Oil & Refining Co. 1 State Lease 1432, Lake Raccourci discovery, Lafourche Parish, La.	14,650	April 1949, Oil producer
The Texas Co. 2 Realty Operators, Vacherie, St. James Parish, Louisiana	14,413	April 1948, Abandoned
Shell Oil Co., Inc., 3 Smith-State, Weeks Island, Iberia Parish, Louisiana (comp. at 13,888 ft.)	14,397	March 1947, Oil producer
Humble-Continental Oil Co. 1 James Baldwin et al, Tamina area, Montgomery County, Texas	14,382	October 1947, Abandoned
Abercrombie-Harrison 1 McDonald, Old Ocean, Brazoria County, Texas (comp. at 12,709 ft.)	14,378	May 1943, Oil producer
Humble Oil & Refg. Co. 1 Lake-Palourde, State Lease 1603, Wildcat, St. Mary Parish, Louisiana	14,319	March 1949, Abandoned
The Texas Co. 1 Dugas & LeBlanc, Ltd., Wildcat, Napoleonville dome, Assumption Parish, La.	14,318	July 1948, Abandoned
Shell Oil Co., Inc., 2 Smith-State, Weeks Island, Iberia Parish, Louisiana (comp. at 13,778 ft.)	14,301	April 1946, Oil producer
Superior Oil Co. 4 Continental Ld. & Fur., Wildcat, Bayou Penchant, Terrebonne Parish, La.	14,296	May 1948, Abandoned
The Texas Co. D-1 State Lease 649-Point au Fer, Wildcat, Terrebonne Parish, Louisiana	14,251	September 1948, Abandoned
Superior Oil Co. of California 2 State-L.L.&E. Unit 12, Four Isle, Terrebonne Parish, Louisiana (comp. at 13,475 ft.)	14,220	September 1947, Gas-condensate
The California Co. 4 E. P. Brady, Alliance, Plaquemines Parish, Louisiana (comp. at 9,082 ft.)	14,187	October 1946, Gas-condensate
Stanolind Oil & Gas Co. 2 State-Timbalier Bay, Lafourche Parish, Louisiana	14,147	March 1948, Abandoned
The Texas Co. 1-C State-Bay St. Elaine, Bay St. Elaine, Terrebonne Parish, La. (comp. at 13,718 ft.)	14,137	October 1948, gas-condensate
Stanolind Oil & Gas Co. 4 Franz Huebner, Lucky, Matagorda County, Texas (comp. at 8,047 ft.)	14,100	October 1946, Oil producer
Stanolind Oil & Gas Co. 1 G. W. Henry, Wildcat, McMullen County, Texas	14,046	June 1948, Abandoned
George Vassen 1 Fee-Tung Oil Corp., Wildcat, Stone County, Mississippi	14,038	Waiting on orders
The Texas Co. 1 Cameron County Water Control & Improvement Dist. 5, Wildcat, Cameron County, Texas	14,033	July 1948, Abandoned
Shell Oil Co., Inc., 1 Smith-State, Weeks Island, Iberia Parish, Louisiana (comp. at 13,250 ft.)	14,023	April 1945, Oil producer
The Texas Co. 45 State-Lake Barre, Lake Barre, Terrebonne Parish, La. (comp. at 11,924 ft.)	14,021	October 1946, Gas-condensate
Pan American Production Co. 1 Claude Boudreaux, Lake Quitman, Terrebonne Parish, Louisiana	14,012	March 1947, Abandoned

World's Largest Tractors

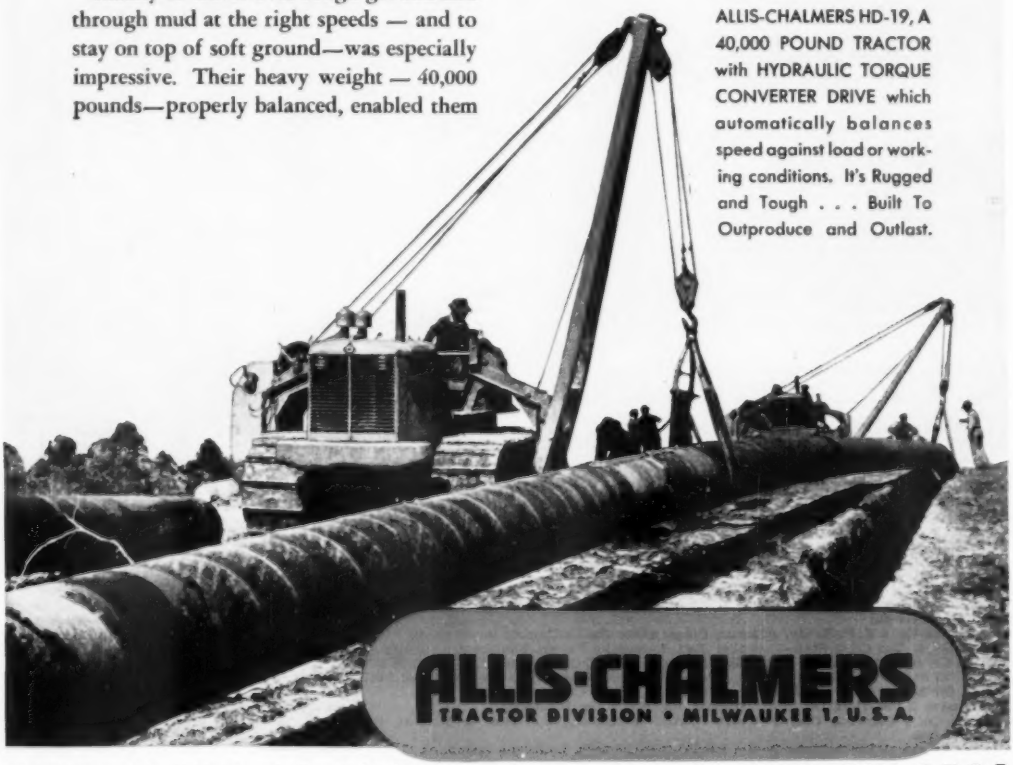
HANDLE PIPE-LAYING WITH NEW EASE AND SPEED

The great lifting capacity, flotation ability and ease of handling of Allis-Chalmers HD-19 Torque Converter Tractors won the admiration of everyone on the Tennessee Gas Transmission Company pipe-laying job near Monroe, Louisiana.

Two of 'em teamed up on this operation — handled both "cradling" and the laying of the 26" pipe, doing the work of three or four conventional tractors.

Ability to travel over rough ground and through mud at the right speeds — and to stay on top of soft ground—was especially impressive. Their heavy weight — 40,000 pounds—properly balanced, enabled them to work with the boom low . . . thus stay ten to twelve feet from edge of trench, preventing cave-ins.

You can also handle your pipe-laying, or any other lifting or grading work with a new ease and speed with the HD-19 — the completely new tractor that gives you a completely new kind of performance. Get the facts from your Allis-Chalmers dealer.



ALLIS-CHALMERS HD-19, A 40,000 POUND TRACTOR with HYDRAULIC TORQUE CONVERTER DRIVE which automatically balances speed against load or working conditions. It's Rugged and Tough . . . Built To Outproduce and Outlast.

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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ORIGINATOR OF THE TORQUE CONVERTER TRACTOR

TABLE 1—GULF COAST WELLS DRILLED BELOW 13,000 FT. (Continued)

Company, well and location—	Total depth (ft.)	Date completed, status
Shell Oil Co., Inc., 1-B Smith-State, Weeks Island, Iberia Parish, Louisiana (comp. at 10,862 ft.)	14,000	December 1947, Oil producer
Humble Oil & Refining Co. 2 J. M. Burguieres Co., Cote Blanche area, St. Mary Parish, Louisiana	14,000	March 1948, Abandoned
The California Co. 1 Louisiana State Lease 822, West Delta, Block 34, offshore Plaquemines Parish, Louisiana	13,968	December 1948, Abandoned
Union Oil Co. of Calif. 4-C Louisiana Furs, Fresh Water Bayou, Vermilion Parish, Louisiana (comp. at 11,555 ft.)	13,941	December 1946, Gas producer
British-American Oil Co. 1 A. M. Dupont Corp., Lapeyrouse, Terrebonne Parish, Louisiana (comp. at 12,640 ft.)	13,857	October 1946, Oil producer
Gulf Refining Co. 1-F Calcasieu Natl. Bank, Hayes, Calcasieu Parish, Louisiana	13,856	December 1946, Abandoned
Placid Oil Co., et al, 1 Otho Shows, Ovett, Jones County, Mississippi	13,825	July 1948, Abandoned
The Texas Co. 12 State-Cote Blanche, Cote Blanche Bay, St. Mary Parish, La. (comp. at 13,300 ft.)	13,824	May 1948, Gas-condensate
The Texas Co. 6 City of New Orleans, Leeville field, Lafourche Parish, Louisiana	13,823	June 1948, Abandoned
Richard W. Norton, Jr., 5 Dantzler Lbr. Co., Wildcat, Stone County, Mississippi	13,820	February 1949, Oil producer
Magnolia Petroleum Co. 1 L. F. Duos, Mamou, Evangeline Parish, Louisiana (comp. at 11,780 ft.)	13,800	August 1946, Oil producer
The Texas Co. 20 Sunset Realty & Planting Co., Paradis, St. Charles Parish, La. (comp., 11,042 ft.)	13,760	July 1948, Gas-condensate
The Texas Co. 2 Mary A. Smythe Nelson et al, Point au Fer, Terrebonne Parish, Louisiana	13,741	July 1948, Abandoned
Union Producing Co. 1 Minnie Brown, Agua Dulce, Nueces County, Texas (comp. at 4,603 ft.)	13,728	February 1939, Gas producer
The Texas Co. 2 Bender Estate, Humble, Harris County, Texas	13,728	February 1947, Abandoned
McCarthy Oil & Gas Corp. 1 E. H. Niedringhaus et al, Blue Lake, Brazoria County, Texas (comp. at 11,016 ft.)	13,640	August 1948, Gas-condensate
Magnolia Petroleum Co. 1 State Lease 838, Block 45, Eugene Island Area, Iberia Parish, Louisiana (Gulf of Mexico) (comp. at 11,351 ft.)	13,636	November 1948, Gas-condensate
Superior Oil Co. A-1 Gulf of Mexico-State Lease 884, Block 71, Vermilion area, Vermilion Parish, Louisiana (comp. at 9,608 ft.)	13,628	July 1948, Gas-condensate
Superior Oil Co. of Calif. 3 State-Calcasieu Lake, Wildcat, Cameron Parish, Louisiana	13,610	1940, Abandoned
Union Producing Co. 2 Buckley-Bourg, Bayou DeLarge, Terrebonne Parish, La. (comp., 13,586 ft.)	13,586	1940, Gas-condensate
Union Producing Co. 3 Buckley-Bourg, Bayou DeLarge, Terrebonne Parish, Louisiana	13,570	January 1948, Abandoned
The Texas Co. 1 Bender Estate, Humble, Harris County, Texas	13,561	1946, Abandoned
Union Producing Co. 1 Fitzpatrick & Vizard, Bayou DeLarge, Terrebonne Parish, Louisiana (comp. at 13,490 ft.)	13,560	July 1943, Gas-condensate
The Texas Co. 1 Bradish-Johnson, Wildcat, Plaquemines Parish, Louisiana	13,560	March 1947, Abandoned
The Chicago Corp. 1 E. Heinsch, West Corpus, Nueces County, Texas (comp. at 8,594 ft.)	13,530	September 1948, Gas-condensate
Placid Oil Co. 1 B. L. Sholar, Ovett, Jones County, Mississippi	13,524	May 1948, Abandoned
Humble Oil & Refining Co. 2 Gulf Coast Realties, Sunniland, Collier County, Florida	13,512	October 1944, Abandoned
Humble Oil & Refining Co. 3 Sauz Ranch-Tenerias Pasture, Wildcat, Kenedy County, Texas	13,509	May 1948, Abandoned
Gulf Oil Corp. 3-A R. S. Jackson, Fannett, Jefferson County, Texas (comp. at 11,053 ft.)	13,503	March 1948, Gas-condensate
Sun Oil Co.-Sohio Oil Co. 3 Elizabeth Regan, Egan, Acadia Parish, Louisiana (comp. at 11,880 ft.)	13,500	May 1946, Gas-condensate
Humble Oil & Refining Co. 1 Humble Fee-Gulf, Weeks Island, Iberia Parish, La. (comp., 13,364 ft.)	13,497	March 1948, Oil producer
Atlantic Refining Co. 3-B Lutcher-Moore, Reserve, St. John the Baptist Parish, Louisiana	13,477	November 1945, Abandoned
Tide Water Associated Oil Co. 1 Lafourche Realty Co., Wildcat, Lafourche Parish, Louisiana	13,471	October 1948, Abandoned
The Texas Co. 5 City of New Orleans, Leeville, Lafourche Parish, Louisiana (comp., 12,985 ft.)	13,468	January 1948, Oil producer
Humble Oil & Refining Co. 2 Sauz Ranch-Tenerias, Wildcat, Willacy County, Texas	13,427	February 1948, Abandoned
Humble Oil & Refining Co. 1 State-Hogg Bayou, Hogg Bayou, St. Mary Parish, Louisiana	13,423	March 1947, Abandoned
Superior Oil Co. of Calif. 1 La Terre, Lake Decade, Terrebonne Parish, La. (comp. at 13,417 ft.)	13,417	1943, Gas-condensate
Fohs Oil Co. 1 Bay Baptiste, Bay Baptiste, Terrebonne Parish, Louisiana (comp. at 11,178 ft.)	13,409	August 1938, Gas-condensate
S. W. Richardson, Inc., 1 Stanolind-Elsie Vidrine, Wildcat, Evangeline Parish, Louisiana	13,407	November 1948, Abandoned
Humble Oil & Refining Co. 1 Tuscon Corp., Laxahatchee, Palm Beach County, Florida	13,375	August 1947, Abandoned
Humble Oil & Refining Co. 2 Armstrong, Tom Armstrong, Kenedy County, Texas	13,369	April 1945, Abandoned
Fohs Oil Co. 1 Buckley-Bourg, Bayou DeLarge, Terrebonne Parish, La. (comp. at 13,266 ft.)	13,333	July 1938, Gas-condensate
Humble Oil & Refining Co. C-1 La Furs, Inc., Wildcat, West Esther area, Vermilion Parish, La.	13,316	November 1948, Abandoned
Stanolind Oil & Gas Co. 1 Robert D. Trahan, Wildcat, Vermilion Parish, Louisiana	13,308	June 1948, Abandoned
The Texas Co. 3-B Rigolets Fur Co., Lafitte, Jefferson Parish, Louisiana (comp. at 10,286 ft.)	13,300	October 1945, Oil producer
Humble Oil & Refining Co. 1 L. Treadwell, Punta Gorda, Charlotte County, Florida	13,300	December 1945, Abandoned
Superior Oil Co. of Calif. 1 McWhorter, Lake Creek, Montgomery County, Texas. (comp., 11,800 ft.)	13,293	1942, Oil producer
Union Oil Co. of Calif. 1 State-L.L.&E. Unit 8, Bay Junop area, Terrebonne Parish, Louisiana	13,285	March 1948, Abandoned
Humble Oil & Refining Co. 1 Cote Blanche, Cote Blanche area, St. Mary Parish, Louisiana	13,281	December 1946, Abandoned
Fohs Oil Co. 1 Buckley-Mohler, Bayou DeLarge, Terrebonne Parish, Louisiana	13,270	September 1939, Abandoned
Amerada Petroleum Corp. 1 Waitschies, North Fannin, Goliad County, Texas (shallow)	13,266	October 1944, Oil producer
Gulf Refining Co. 1 Mermentau Mineral & Land Co., Inc., Little Chenier field, Cameron Parish, La.	13,260	March 1949, Oil producer
The Texas Co. 44 State-Lake Barre, Lake Barre, Terrebonne Parish, La. (comp. at 11,788 ft.)	13,259	July 1945, Gas-condensate
Humble Oil & Refining Co. 1-B Houston Farms, Halls Bayou, Brazoria County, Texas (comp. at 10,917 ft.)	13,253	February 1943, Gas-condensate
Gulf Refining Co. 1 L. L. Majors, Ovett, Jones County, Mississippi (comp. at 13,082 ft.)	13,251	January 1948, Oil producer
Superior Oil Co. of Calif. 1-19 L.L.&E.-State Unit 19, Four Isle Dome, Terrebonne Parish, Louisiana (comp. at 12,210 ft.)	13,230	November 1948, Oil producer
Stanolind Oil & Refining Co. 3-B Calcasieu, South Elton, Jefferson Davis Parish, Louisiana	13,210	June 1938, Abandoned
Sun Oil Co. 6 D. J. Sullivan, Canales-Sullivan, Brooks County, Texas (comp. at 10,180 ft.)	13,206	August 1946, Gas-condensate
Humble Oil & Refining Co. 1 W. W. Moore, Jr., Bonweir, Newton County, Texas	13,195	April 1946, Abandoned
Stanolind Oil & Gas Co. 2 E. M. Watkins, Wildcat, Vermilion Parish, Louisiana	13,159	September 1948, Abandoned
Humble Oil & Refining Co. 1-B Bell, South Oberlin, Allen Parish, Louisiana (comp., 12,662 ft.)	13,150	February 1946, Gas-condensate
Humble Oil & Refining Co. 2 State Lease 1255, Calcasieu Lake, Wildcat, Cameron Parish, La.	13,146	December 1948, Abandoned
Gulf Refining Co. 3 Ruth Fleming et al, Wildcat, St. Martin Parish, Louisiana (comp. at 10,742 ft.)	13,141	October 1946, Gas-condensate
Gulf Oil Corp. 1-A E. A. Lindsey et al, Wildcat, Jefferson County, Texas	13,132	September 1948, Abandoned
Stanolind Oil & Gas Co. 1 State-Timbalier Bay, Timbalier Bay, Terrebonne Parish, Louisiana	13,129	August 1947, Abandoned
The Texas Co. 2 Fannie R. King, Fausse Point, Iberia Parish, Louisiana	13,122	May 1947, Abandoned
F. A. Callery 1 E. P. Brady, Lapeyrouse, Terrebonne Parish, Louisiana	13,110	January 1948, Abandoned
Continental Oil Co. 1 Adolph Hebert, Big Lake, Cameron Parish, Louisiana (comp. at 8,586 ft.)	13,084	September 1943, Gas-condensate
Sohio Petroleum Co. 1 S. W. Sweeney, Wildcat, South Grand Chenier, Cameron Parish, Louisiana (comp. at 8,250 ft.)	13,067	October 1948, Gas-condensate
The Texas Co. 110 L.L.&E.-Leeville, Leeville, Lafourche Parish, Louisiana	13,067	June 1948, Abandoned
Shell Oil Co., Inc., 4 Smith-State, Weeks Island, Iberia Parish, Louisiana (comp. at 13,020 ft.)	13,060	December 1947, Oil producer
Tide Water Associated Oil Co. 1 State Lease 1299, discovery well Manila Village field, Jefferson Parish, Louisiana	13,050	March 1949, Oil producer
Gulf Refining Co. 1 De Armas, Grand Bay, Plaquemines Parish, Louisiana	13,023	April 1946, Abandoned
Tide Water Associated Oil Co. 29 Buras Levee, Venice, Plaquemines Parish, La. (comp., 12,039 ft.)	13,020	April 1946, Gas-condensate
Gulf Refining Co. 60 Louisiana State "QQ," Quarantine, Plaquemines Parish, La. (comp., 8,330 ft.)	13,014	June 1948, Oil producer
Gulf Oil Corp. 1 Hooks Estate, Hankamer, Liberty County, Texas	13,011	September 1945, Abandoned
Continental Oil Co. 1 Mrs. A. Dobbertine, Johnson Bayou, Cameron Parish, Louisiana	13,008	October 1945, Abandoned
W. T. Burton 1 S. J. Simmoneaux, Des Allemands, St. Charles Parish, Louisiana	13,006	August 1947, Abandoned
Shell Oil Co., Inc., 1 Weeks Island-State Unit 1, Weeks Island, Iberia Parish, La. (comp., 12,917 ft.)	13,000	July 1947, Oil producer
Gulf Refining Co. 1 Foster, Wildcat, St. Mary Parish, Louisiana	13,000	February 1948, Abandoned
General Crude Oil Co. 21-B Sun-Stanolind Esperson Fee, South Esperson, Liberty County, Texas	13,000	April 1948, Abandoned
Stanolind Oil & Gas Co. B-1 Buckner Orphans Home, Wildcat, Matagorda County, Texas	13,000	October 1948, Abandoned

drilling is fast being approached in the Gulf Coast. Bell remarked: "The costs are almost prohibitive. The probability of adding greatly to our oil and gas reserves is greatly reduced."

Bell, however, did express the belief that the industry has the know how and equipment to drill to 20,000 ft. Also, he continued, "There appears to be no reason why producible hydrocarbons cannot be found under favorable geologic conditions, down to 20,000 ft."

In emphasizing the geological aspects of deep drilling, Bell gave a good description of what might be expected at great depths. He stated: "From the standpoint of stratigraphy we may expect to find sedimentary beds down to the basement complex. It is doubtful if we will find the basement complex above 20,000 ft. in the coastal area; therefore we should have no hesitation about the presence of sedimentary rocks down to that depth.

"The presence of reservoirs at greater depths is, perhaps, a little more questionable, yet our experience seems to indicate there can be reservoir space below the depths we have reached so far and these reservoirs can occur in lime or in sand. In sand sections the permeability and porosity may be so reduced that a greater thickness of sand section will be required in order to have space comparable to that at shallower depths. This reduced reservoir space, however, should be at least partially offset by the higher reservoir pressures encountered with depth. . . There are numerous operational problems, such as abnormal pressures, high temperatures, and many others, which will be more severe, but not insurmountable."

Improved Equipment

Humble revealed to the industry this past year some of the results of its drilling-equipment development program. The improved equipment—primarily designed to better handle drilling to 20,000 ft.—was demonstrated on a test rig working in Sugar Valley field, 60 miles southwest of Houston. Most unusual feature of this "world's most automatic drilling rig," is the remote-control pipe racker which takes the work out of racking pipe. Coupled with the pipe racker are remote-control power tongs which eliminate the manual handling of tongs.

The basic reasoning behind Humble's drilling-equipment development program is explained by company engineers as follows:

By 1945, as the war neared its end, the trend toward deeper drilling to find new reserves was established and manufacturers began designing equipment to drill as deep as 20,000 ft. More horsepower was required for hoisting long strings of pipe, and the weight of drilling equipment to meet these peak demands increased accordingly. Deep-hole experience indicated then that heavy powerful rigs were not the only requirement for deeper drilling. The higher costs of deep drilling demanded equipment vastly more efficient.

The duration of repetitive operations, especially round trips, increases greatly with depth, so much that often more time is consumed changing bits than drilling when below 10,000 ft. Harder formations found at greater depths reduce bit life rapidly, resulting in more frequent round trips as the bit goes below 10,000 ft. In addition, more rig time is consumed and hole left open longer, an added blowout hazard.

Improving Safety

With these facts in mind, Humble engineers began investigating the problems with a view to improving drilling safety, reducing the actual work of the crews, and protecting deep holes. Automatic equipment for drilling was seen as necessary for development of any large-scale drilling programs approaching the extreme depths which have already been attained. In addition, it is felt that automatic equipment will prolong the useful working life of drilling crews carrying out today's drilling operations. Of most importance, however, operating safety will be greatly improved and the drilling crews will be able to do more maintenance work.

In Houston, the local A.P.I. chapter is sponsoring a study group concerned with deep drilling. A detailed analysis is being made of the most satisfactory techniques and equipment for 20,000-ft. drilling. Expected problems are being thoroughly discussed. Among the thoughts that have been expressed are that a new type of lost-return material or mud to seal fissures will be needed. Trouble may be experienced with sidewall samplers because of harder formations and higher temperatures. Temperatures may affect mud properties in a manner which will greatly alter electric-logging results. Very large pump horsepowers will be required to give the upward circulation velocities that have ordinarily been considered desirable.

TABLE 2—NUMBER OF TESTS DRILLED BELOW 12,000 FT. BY YEARS

Year	Below 16,000 ft.	15,000 to 16,000 ft.	14,000 to 15,000 ft.	13,000 to 14,000 ft.	12,000 to 13,000 ft.	Total
1948	1	4	14	37	70	126
1947	1	4	6	10	58	79
1946	0	0	5	13	39	57
1945	0	2	2	7	33	44
1944	1	0	0	2	26	29
1943	0	0	1	4	10	15
1942	0	0	0	1	9	10
1941	0	0	0	0	11	11
1940	0	0	0	2	5	7
1939	0	0	0	2	12	14
1938	0	0	0	3	2	5
1937	0	0	0	0	5	5
Total	3	10	28	81	280	402

TABLE 3—NUMBER OF PRODUCING WELLS COMPLETED BELOW 12,000 FT. BY FIELDS
(Includes figures through December 31, 1948)

Field and location—	14,000 to 15,000 ft.	13,000 to 14,000 ft.	12,000 to 13,000 ft.	Total
Weeks Island, Iberia Parish, Louisiana	2	6	3	11
Bayou DeLarge, Terrebonne Parish, Louisiana	0	3	0	3
Venice, Plaquemines Parish, Louisiana	0	0	3	3
Four Isle, Terrebonne Parish, Louisiana	0	1	1	2
Horseshoe Bayou, St. Mary Parish, Louisiana	0	0	2	2
Leeville, Lafourche Parish, Louisiana	1	0	1	2
Bayou Sale, St. Mary Parish, Louisiana	0	0	1	1
Bay St. Elaine, Terrebonne Parish, Louisiana	0	1	0	1
Cote Blanche Bay, St. Mary Parish, Louisiana	0	1	0	1
Lake DeCade, Terrebonne Parish, Louisiana	0	1	0	1
Lake Hermitage, Terrebonne Parish, Louisiana	0	0	1	1
Lake Pelto, Terrebonne Parish, Louisiana	0	0	1	1
Lapeyrouse, Terrebonne Parish, Louisiana	0	0	1	1
Old Ocean, Brazoria County, Texas	0	0	1	1
Ovett, Jones County, Mississippi	0	1	0	1
Queen Bess Island, Jefferson Parish, Louisiana	0	1	0	1
South Mayes, Chambers County, Texas	0	0	1	1
South Oberlin, Allen Parish, Louisiana	0	0	1	1
Total	3	15	17	35

TABLE 4—NUMBER OF TESTS DRILLED BELOW 12,000 FT. BY STATES
(Includes figures through December 31, 1948)

District—	Below 16,000 ft.	15,000 to 16,000 ft.	14,000 to 15,000 ft.	13,000 to 14,000 ft.	12,000 to 13,000 ft.	Total
Louisiana coast	1	5	22	56	219	303
Texas coast	2	2	5	17	47	73
Mississippi	0	1	1	5	7	14
Alabama	0	1	0	0	2	3
Florida	0	1	0	3	5	9
Total	3	10	28	81	280	402

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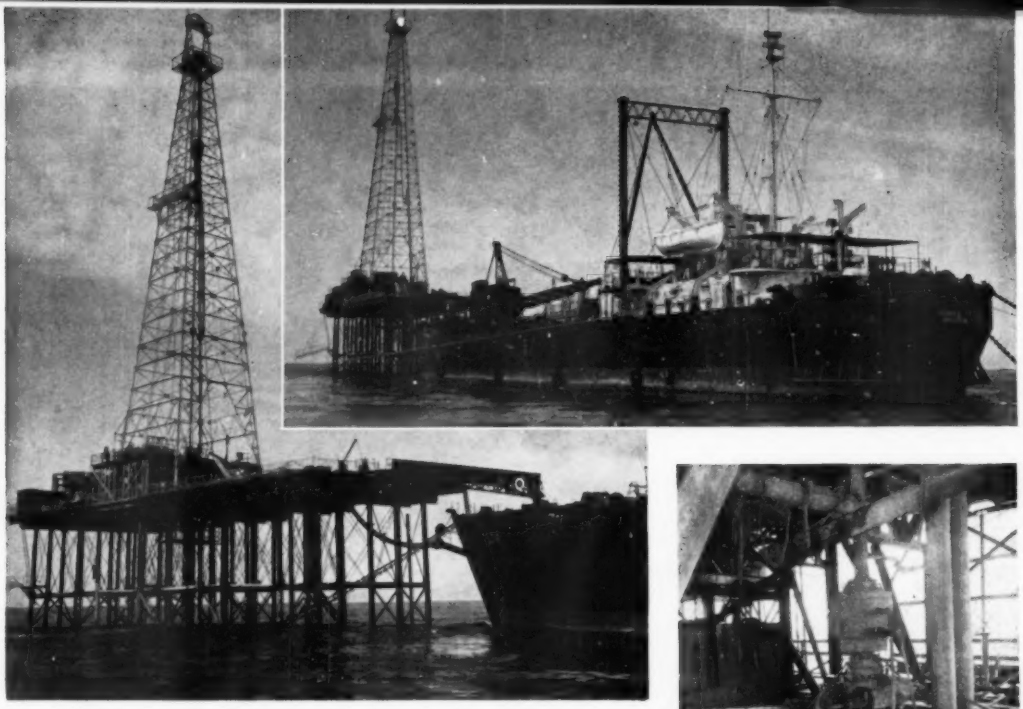
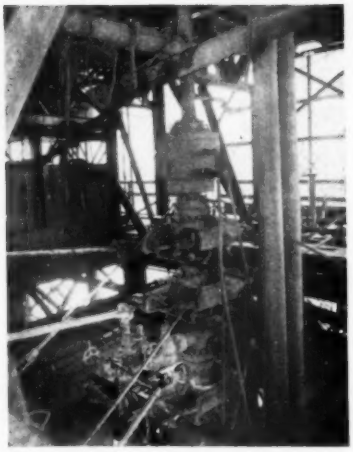




Above and upper right: Humble Oil & Refining Co. has been one of the most active offshore operators, has eight active locations at the present time in Texas and Louisiana coastal waters. The L.S.T.-platform combination setup is making hole off the Louisiana coast. Right: This impressive blowout-preventer hookup is on a Kerr-McGee Oil Industries, Inc., well in the Gulf. An investment of some $30,000 is represented by this equipment. Special precautions are taken in the drilling of offshore wells because of the obvious hazards of a blowout at sea. On this particular well there are three pressure-operated blowout preventers, and one pressure-operated master gate

by Leigh S. McCaslin, Jr.

OFFSHORE DRILLING

Now expanded to 27 operations, despite litigation relative to ownership of tidelands

WITH 27 active operations under way (drilling, rigging up, or building structures), the pace of drilling activity in the open waters of the Gulf of Mexico is only slightly higher at the present time than a year ago. Expectations a year ago were that a greatly accelerated program would be carried out. However, several factors have acted as a brake. Chief among these has been the state-federal dispute over ownership of the so-called "tidelands" area. Other pertinent factors include the high cost of operation, hazard of operation, and the national crude-supply picture.

Several companies, notably Humble Oil & Refining Co., Magnolia Petroleum Co., and Kerr-McGee Oil Industries, Inc., et al, have continued large-scale operations in the gulf. However, many companies have either retard-

The Current Picture

In brief, the current over-all picture of Texas and Louisiana offshore development is as follows:

Oil-industry investment—an estimated $75,000,000.

2,191,179 acres under lease for a $22,860,312 bonus in Louisiana.

369,665 acres under lease for a $7,236,108 bonus in Texas.

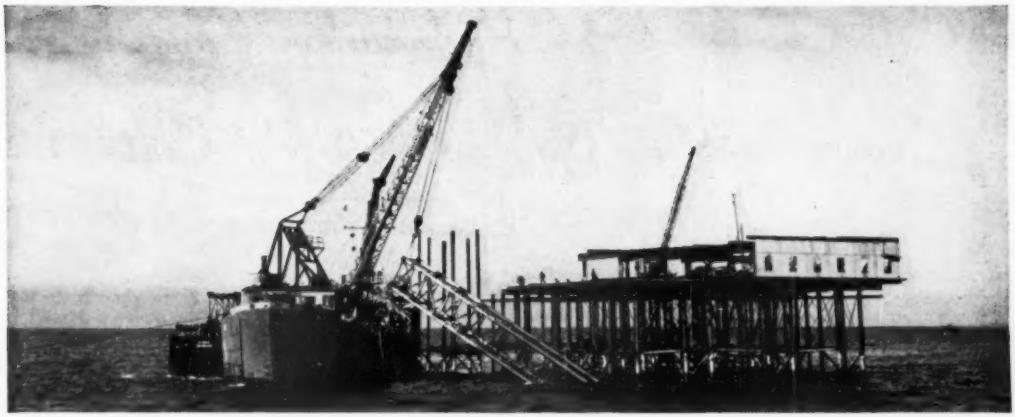
Six oil, three gas-distillate, and two gas discoveries.

Operators with production: Magnolia Petroleum Co., Humble Oil & Refining Co., Kerr-McGee Oil Industries, Inc., Phillips Petroleum Co., Stanolind Oil & Gas Co., Superior Oil Co., Barnsdall Oil Co., Seaboard Oil Co., The California Co., Callery & Hurt, and Shell Oil Co., Inc.

39 active drilling operations and announced locations.

24 companies, individuals, or combinations of companies holding Louisiana leases.

10 companies or combinations of companies holding Texas leases.



Building a platform for a drilling rig in 50 ft. of gulf water is a difficult task. Here at this Humble location a specially equipped construction ship lifts one of the many 72-ft. 18-ton templates used on the job. The templates are sunk 15 ft. into the gulf's bottom, for use as support and guides for piling

ed or simply not begun their development of tideland leases. During recent weeks it has been reported that one concern holding extensive leases has curtailed its 1949 drilling program from four to a single well. Another major lease holder is planning to sell 7 out of 10 war-surplus L.S.T.'s which were originally purchased for conversion to offshore drilling.

The reasoning of those companies which are continuing large-scale operations is illustrated by an excerpt from the annual report of Humble. "The company is proceeding with its expensive offshore drilling program in the Gulf of Mexico, even though an uncertainty now exists as to the ownership and control of the areas involved. It considers exploration of the potential resources of these areas to be essential in order to keep its leases in force, and desirable from the standpoint of providing for future needs of consumers and for national security. The risks in this undertaking have been increased in a measure by action of the federal Government in filing suits against the states of Texas and Louisiana, claiming paramount rights in the offshore lands abutting these states. An early settlement of this controversy is essential. On legal and historic grounds, the states have a better claim to ownership of the Continental Shelf, especially the areas within the traditional state boundaries.

"Moreover, the consensus in the oil industry as expressed by the National Petroleum Council is that the resources of the Continental Shelf will be more rapidly and satisfactorily developed under state rather than federal ownership. The controversy in the main is between the federal Government and the littoral states, as the companies holding leases on the Continental Shelf will have to pay royalties to the landowner in either case. These leases were purchased in good faith from Texas and Louisiana during a period in which there was no challenge of or attack upon their titles. Even if the federal Government succeeds in establishing its claim, the rights of companies which have purchased these leases should be confirmed on the basis of long-established precedents, thereby enabling them to continue the exploration and development work already undertaken."

Developments in Offshore Methods

From an operating standpoint, several interesting developments occurred during the past year. The barge-platform combination continues

(Continued on page 347)

CURRENT LOUISIANA OFFSHORE LEASES

	No. of leases	Acres	Avg. cost per acre	Bonus paid
Barnsdall	5	9,989.06	$3.58	$35,808.00
Barnsdall, Seaboard, Callery & Hurt	20	50,872.76	9.12	463,844.30
California Co.	59	173,754.71	12.71	2,208,333.00
Continental Oil Co.	1	2,500.00	15.50	38,750.00
I. J. Goode	8	18,611.00	7.52	139,936.10
Gulf Refining Co.	6	18,374.00	12.42	228,154.25
Humble Oil & Refining Co.	45	170,941.36	21.73	3,714,953.39
Hunt Oil Co.	2	5,690.00	15.60	88,764.80
Wallace B. Jayred	1	1,248.00	20.03	25,000.00
Kerr-McGee Oil Ind., Inc.	9	34,762.00	16.02	557,051.00
Kerr-McGee, Phillips and Stanolind	11	55,000.00	7.77	427,500.00
Magnolia Petroleum Co.	69	249,851.98	5.35	1,335,887.21
Pan American and Seaboard	27	62,936.86	14.72	926,347.91
Phillips Petroleum Co.	22	78,888.42	20.96	1,653,432.00
Phillips and Kerr-McGee	1	2,500.00	8.00	20,000.00
Pure Oil Co.	55	146,227.75	6.79	992,425.00
Shell Oil Co., Inc.	61	205,193.51	9.33	1,915,438.37
Sohio Petroleum Co.	2	7,207.00	5.31	38,269.17
Standard Combine (Continental, Tide Water, Atlantic Refining and Cities Service)	99	405,855.40	3.99	1,617,912.00
Stanolind	65	185,243.86	9.04	1,674,959.87
Sun Oil Co.	20	57,192.50	15.54	888,936.95
Superior Oil Co.	38	129,571.44	21.27	2,756,215.93
Texas Co.	27	100,857.34	9.42	950,167.61
Union Oil Co. of California	5	17,910.13	11.52	206,249.92
Total	658	2,191,179.08	$10.43	$22,860,312.48

CURRENT TEXAS OFFSHORE LEASES

	No. of leases	Acres	Avg. cost per acre	Bonus paid
Brazos Oil Co.	3	1,644.00	$2.98	$4,965.00
Humble Oil & Refining Co.	82	99,131.00	15.70	1,555,961.06
Humble, Ohio, and Melban	4	5,760.00	17.09	98,458.80
Melban Oil Co.	85	117,570.00	11.19	1,315,218.58
Phillips Petroleum Co.	3	2,686.00	17.57	47,196.00
Roxo Oil Co.	1	320.00	8.25	2,640.00
Stanolind	40	57,440.00	47.65	2,736,936.60
Sun Oil Co.	4	2,774.00	31.71	87,964.00
Tidelands and Superior	52	65,280.00	10.15	662,720.00
Texas Co.	24	17,040.00	42.49	724,048.00
Total	298	369,665.00	$19.57	$7,236,108.04
Grand total, Texas and Louisiana	956	2,560,844.08	$11.75	$30,096,420.52

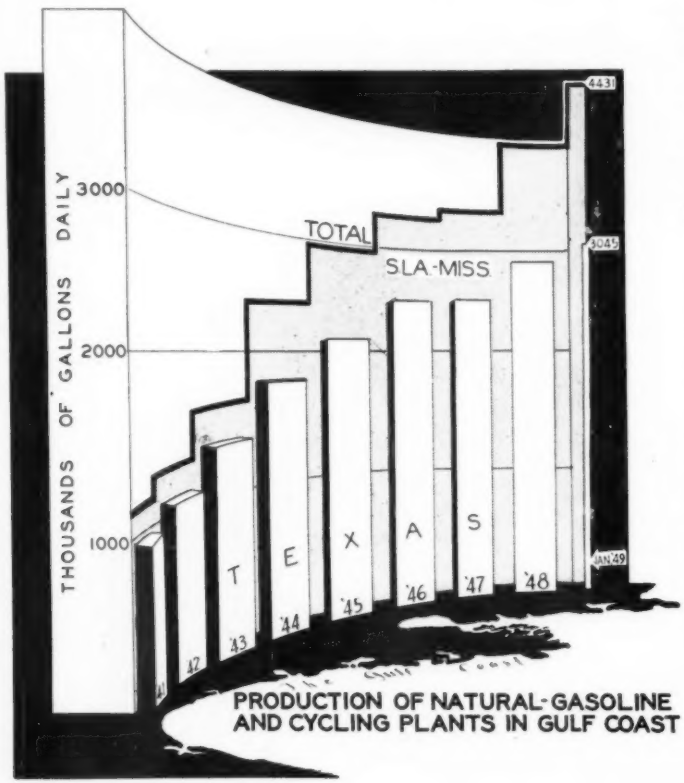
Gulf Coast's Light-Hydrocarbon Capacity Shows 10-Year Gain of 960 Per Cent

by John C. Casper

GULF COAST light-hydrocarbon producing capacity has increased 960 per cent in the last 10 years. The Oil and Gas Journal's current survey of plants in the area indicates a total capacity of 6,678,300 gal. daily or about 28 per cent of the total for the entire United States. Gas processing has been the record setter for the petroleum industry and Gulf Coast expansion has been the outstanding example of rapid development. Thus, the increases in plant capacity in the area represent a superlative of a superlative.

In the period from 1939 to 1949, producing capacity in the Gulf Coast area increased about 6,050,000 gal. daily while the gain for all other areas in the country was about 6,740,000 gal. daily. Gulf Coast expansion was only about 10 per cent less than the total for all other areas. The comparison on a percentage basis is even more impressive. The rest of the country had a 66 per cent gain in capacity for the 1939-49 period which is about in line with normal growth trends in the petroleum industry. With this as a background, the 960 per cent gain for the Gulf Coast sets a hard-to-beat record for expansion. In 1939, about 5.7 per cent of the country's total producing capacity was located in the Gulf Coast area compared with the current 28 per cent position.

There have been several important reasons for the rapid expansion in gas processing along the Gulf Coast. The area has a large volume of available gas, both casing head and from gas wells. Over 30 per cent of total refining capacity is located in the area and these refiners as producers of motor fuel are good potential users of plant-produced natural gasoline. In 1948, refiners in the area reported a daily average use of products from plants amounting to almost 2,500,000 gal. The increased demand for L.P.G. has given value to products that were at one time considered to be of such little value that no records were kept of total production. Probably the greatest present influence is the general recognition of the need for conservation and use of all natural resources.



PRODUCTION OF NATURAL-GASOLINE AND CYCLING PLANTS IN GULF COAST

Larger, More Efficient Plants

Much of the growth in the area has come in a period when the trend has been toward larger and more efficient plants. In 1939, there were 670 plants in the country with a capacity of about 10,900,000 gal. per day compared with the current count of 533 plants with a combined capacity of about 23,700,000 gal. per day. This same trend has been a factor in the Gulf Coast expansion and today the area has some of the largest plants in the nation.

Most plant production records before 1940 do not include output of L.P.G. and are not strictly comparable with current production data. However, L.P.G. production was not large enough to cause any great distortion in the production trend curve. In 1941, Gulf Coast production accounted for about 12 per cent of the United States total but the wartime gains for the area were relatively greater than in other areas of the country so that by 1945 the Gulf Coast portion had moved up to 23 per cent of the total. Rapid expansion in some of the other areas came soon after the close of the war but Gulf Coast completions in 1948 increased productive capacity in the area enough so that in January of this year the plants in this strip along the gulf produced slightly more than one-fourth of the total.

It was in 1948 that Texas surpassed California and became the leading producer of light hydrocarbons. At that time, a major part of the state's capacity was located in East Texas and in the Panhandle. At the begin-

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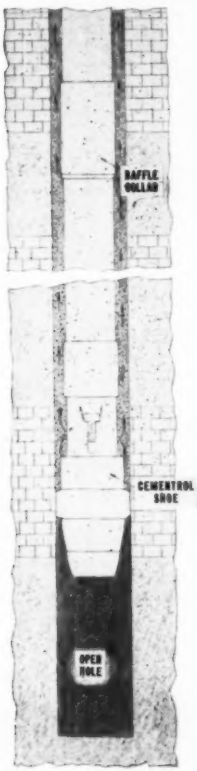

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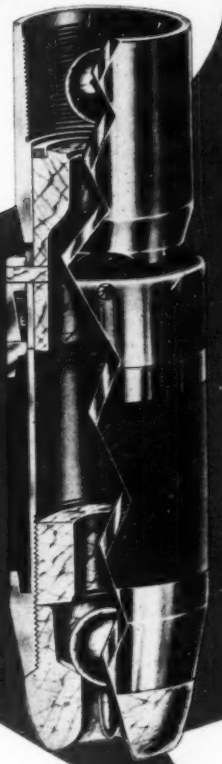

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Position after expansion by pump pressure.

The CEMENTROL Principal was developed to supplant conventional methods and to provide a means of overcoming well completion difficulties caused by cement intrusion into the open oil or gas bearing formation below the casing seat.

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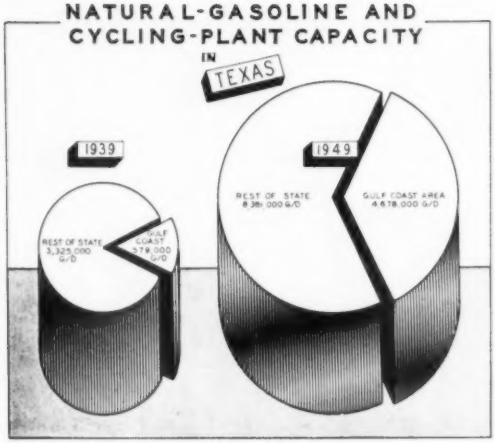


Survey of Texas and Louisiana Gulf Coast Gas-Processing Plants

TEXAS
Cycling Plants

Company, field or plant, and county—	Approx. cap. (gal. per day)
Agua Dulce Co., The, Agua Dulce, Nueces	*40,000
American Liberty Oil Co., Blessing, Matagorda	40,000
American Republics, Joe's Lake, Tyler	12,000
Chicago Corp., The:	
Gulf Plains, Stratton, Nueces	*150,000
Coastal plant, Nueces	*150,000
Wardner plant, Nueces	*150,000
Distillate Production Corp., North Houston, Harris	*75,000
Duval Gasoline Co., Southland, Duval	5,000
Federal Oil & Gas Industries, Inc., Joyce Richardson, Harris	20,000
Francitas Gas Co., Francitas, Jackson	*44,000
Gasoline Production Corp., Mineral, Bee	65,000
Gillring Oil Co., Agua Dulce, Nueces	*40,000
Gray Wolfe Co., Pinehurst, Montgomery	18,000
Harrell, H. M., Ehrhardt, Harris	40,000
Humble Oil & Refining Co., Katy, Waller	*585,000
La Gloria Corp., La Gloria, Jim Wells	*126,000
Magnolia Petroleum Co., Seeligson, Jim Wells	500,000
Pan American Production Co., Olive, Hardin	21,000
Plymouth Oil Co., Plymouth, San Patricio	75,000
Polomo Co., Puencitas, Nueces	30,000
Shell Oil Co., Inc., Sheridan, Colorado	*282,000
Stanolind Oil & Gas Co.:	
La Rosa, Refugio	*50,000
Burnell-North Pettus, Bee	*†287,000
Superior Oil Co., Lake Creek, Montgomery	*462,000
Trinity Gas Corp., Sejita, Duval	*76,000
Western Natural Gas Co., Goebel, Live Oak	25,200
Total	3,368,200

TEXAS
Natural-Gasoline Plants

Company, field or plant, and county—	Approx. cap. (gal. per day)
Abercrombie Co., J. S., Old Ocean, Brazoria	*252,000
Bennett Oil & Refining Co., Refugio, Refugio	20,000
Continental Oil Co., Rincon, Starr	*25,000
Danciger Oil & Refining Co., Pledger, Matagorda	*40,000
Del Ray Petroleum Co., Hardin, Liberty	*12,000
Duval Gasoline Co., Benavides, Duval	*17,000
Hamman Oil & Refining Co., Hamman, Matagorda	10,500
Humble Oil & Refining Co.:	
Anahuac, Chambers	25,000
Clear Lake, Friendswood, Harris	*35,000
Conroe, Montgomery	12,600
Flour Bluff, Nueces	8,100
Heyser, Calhoun	7,300
Tomball, Harris	21,000
Tom O'Connor, Refugio	*26,000
Hunt Oil Co., Harleton, Harris	*†30,000
Magnolia Petroleum Co., Vanderbilt, Jackson	*35,000
McCarthy Chemical Co.:	
Stowell-Jackson Pasture, Jefferson-Chambers	*105,000
Stowell-Jackson Pasture, Jefferson-Chambers	*275,000
Midland Gasoline Co., Conroe, Montgomery	*40,000
Petroleum Reserve Corp., Piedra Pintas, Duval	500
Sinclair Prairie Oil Co., East White Point, San Patricio	*30,000
Southern Minerals Corp.:	
Saxet, Nueces	*25,000
Stratton, Nueces	*15,000
Stanolind Oil & Gas Co.:	
Luby, Nueces	*45,000
Hastings, Brazoria	*60,000
Sun Oil Co., Sun, Starr	*†73,000
United Gas Pipe Line Co.:	
Agua Dulce, Nueces	*49,000
Coy City, Karnes	*†33,000
Warren Petroleum Corp., Fairbanks, Harris	*40,000
West Gasoline Co., Cleveland, Liberty	*12,000
Total	1,379,000

LOUISIANA
Cycling Plants

Company, field or plant, and parish—	Approx. cap. (gal. per day)
Anchor Gasoline Corp., Eola, Avoyelles	*30,000
Barnsdall Oil Co., West Tepetate, Jeff Davis	*40,000
California Co., The, Lake St. John, Tensas	*400,000
Stanolind Oil & Gas Co., South Jennings, Jefferson Davis	*58,000
Texas Co., The, Operator, Erath, Vermilion	*672,000
Texas Co., The, Bateman Lake, St. Mary	*75,600
Total	1,275,600

LOUISIANA
Natural-Gasoline Plants

Company, field or plant, and parish—	Approx. cap. (gal. per day)
Anchor Gasoline Corp., Pine Prairie, Evangeline	*15,000
Anse La Butte Gasoline Co., Anse La Butte, St. Martin	*12,000
Atlantic Refining Co., Neale, Beauregard	*40,000
Cheneyville Gasoline Co., Cheneyville, Rapides	7,500
Continental Oil Co.:	
Gillis, Calcasieu	10,000
Tepetate, Acadia	12,000
Ville Platte, Evangeline	*100,000
Shell Oil Co., Inc., Iowa, Calcasieu	15,000
Texas Co., The, Lafitte, Jefferson	14,000
Total	225,500

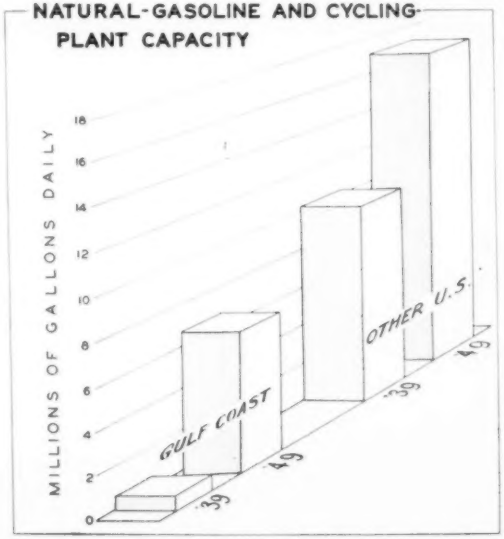
MISSISSIPPI
Cycling Plant

California Co., The, Cranfield, Adams	*400,000

Natural-Gasoline Plant

California Co., The, Brookhaven, Lincoln	*†30,000

*Includes L.P.G. †Under construction.



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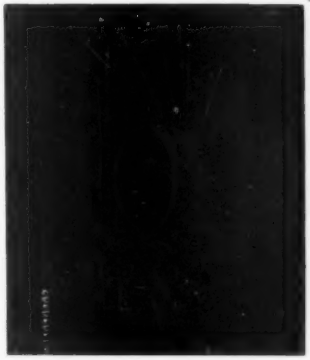
1. **The Weatherford Hi-Column Cementing Head in action . . .** While releasing plugs on this Canadian Job, the new Head permitted continuous reciprocation of Scratchers and Centralizers in the cement, as well as continuous circulation of cement in the hole. This can not be accomplished with any other cementing head.
2. **316 Weatherford Reversible Scratchers** were used throughout the open hole on this Canadian Job according to the Weatherford Formula.
3. **57 Weatherford Spiral Centralizers** were employed on this Canadian Job according to the Weatherford Formula.



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Longview, Texas	3291
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Houston, Texas	Yukon 8-5471 or Wentworth 3-1100
Oklahoma City, Okla.	62-3904
Shreveport, La.	7-5237
Harvey, La.	Uptown 3981
New Iberia, La.	1646
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Edmonton, Alberta	3-3645 or 8-4848
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- 200 sacks of clean cement were circulated back to surface.
- 4,180 sacks of cement were used.
- The building of strong cement walls by the Scratchers and Centralizers at all zones served as a foundation for tall cement columns.

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PLANT PRODUCTION IN 1948 BY MONTHS
(Thousands of gallons daily)

	Texas Gulf	S. La. and Miss.	Total Gulf	Total U.S.
January	2,819	1,046	3,865	16,254
February	2,806	1,096	3,902	16,429
March	2,838	1,061	3,899	16,621
April	2,887	1,016	3,903	16,347
May	2,772	1,071	3,843	16,318
June	2,754	1,024	3,778	16,131
July	2,730	1,103	3,833	16,045
August	2,825	1,008	3,833	16,433
September	2,914	1,041	3,955	16,120
October	2,978	1,124	4,102	17,349
November	3,051	1,066	4,117	18,043
December	3,091	1,066	4,157	18,220

PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS
(Thousands of gallons daily)

Year	Texas Gulf	S. La. and Miss.	Total Gulf	Total U. S.	Per cent U. S. on Gulf Coast
1941	964	169	1,133	9,304	12.2
1942	1,092	200	1,292	9,588	13.5
1943	1,377	225	1,602	10,093	15.9
1944	1,782	667	2,449	11,481	21.3
1945	2,116	871	2,987	12,888	23.2
1946	2,354	906	3,260	13,318	24.4
1947	2,350	990	3,340	15,209	22.0
1948	2,872	1,059	3,931	16,694	23.5
January 1949	3,045	1,326	4,431	17,595	25.2

NATURAL-GASOLINE AND CYCLING PLANT CAPACITY, GULF COAST

	Gallons daily
Texas Gulf Coast:	
Cycling plants	3,368,200
Natural-gasoline plants	1,379,000
Total	4,747,200
Louisiana Gulf Coast:	
Cycling plants	1,275,600
Natural-gasoline plants	225,500
Total	1,501,100
Mississippi:	
Cycling plant	400,000
Natural-gasoline plant	30,000
Total	430,000
Total Gulf Coast	6,678,300

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ning of 1939 there were fewer than 25 plants in the Gulf Coast districts with a combined capacity of about 580,000 gal. per day. Today the Katy plant has a greater capacity than the total for all plants in 1939. Gulf Coast plants in 1939 accounted for about 15 per cent of the state's capacity, but today the plants in this area have a combined capacity that is 20 per cent greater than the state total for 1939 and is 26 per cent of the current total for the state. The 1949 state capacity is 3.4 times the total for 1939 while the Gulf Coast producing potential has grown to eight times the area's capacity 10 years ago.

Shifts in Production

Shifts in plant production in Gulf Coast districts of Texas have followed the general trend toward a greater yield of L.P.G. A comparison of plant production in January 1949 with January 1947 indicates a general increase of about 25 per cent. Condensate production at plants was up about 20 per cent and natural gasoline increased about 12.5 per cent. On the other hand, butane-propane production was greater by about 41 per cent. Other products, representing a smaller part of the total, increased about 80 per cent. The postwar construction program with heavy completions in 1948 gave the area its major production gains in the latter part of 1948 and in the early months of this year.

On a percentage basis, the growth in gas processing in southern Louisiana has been even greater than in Texas Gulf Coast since extensive development in this part of the state did not start until the last war. In 1939 the Louisiana Gulf Coast area

had only four plants with an aggregate producing capacity of about 46,000 gal. daily. Most of the natural-gasoline plants were located in the northern part of the state. Since total capacity for the state was about 475,000 gal. per day, the Gulf Coast share was less than 10 per cent, and on a country-wide basis it accounted for less than 0.5 per cent of the nation's capacity. The growth of gas processing for Louisiana Gulf Coast stands out when the results of the current census are compared with the above figures. The 15 plants in the area now have a total capacity of 1,500,000 gal. daily or more than three times the state total in 1939 and 44 per cent of the current state capacity. These plants now represent 6.3 per cent of the nation's total.

Available production data for Louisiana Gulf do not cover exactly the same area included in the plant census but the figures in the accompanying table do indicate a very steep upward trend for the district. Daily average production in January 1949 was more than eight times that of 1941.

Large Cycling Plant

Gas processing is a postwar development for Mississippi, but the state has a very large cycling plant in operation and a natural-gasoline plant scheduled for early completion.

The entire coastal area, starting at Mississippi and extending almost to the Mexican border, has been a focal point in gas-processing development in the past 10 years. The area played a big part in meeting the wartime needs for light products. Postwar demands have been met by a gigantic construction program. Much attention has been given to conservation of casing-head gas. The area now has a big part of the nation's producing capacity.

Problems of the light-hydrocarbon section of the industry now become particular problems for the Gulf Coast. The ever-increasing demand for natural gas and programed construction of more large natural-gas lines call for more gas processing. More high-gas-ratio fields will be discovered. Advances in technology will add other pools to the list of those where cycling is advisable. Changes are taking place in general concepts on conservation. It is not enough to stop gas flaring and market the gas from a field if the reuse of the gas will produce a marked increase in ultimate production of the field. All of these may mean a continuing program of construction.

Such construction will add further to the capacity to produce light hydrocarbons. Since current capacity seems sufficient to meet current demands, the coming years may bring a switch in the industry's problems from one of meeting demands to that of finding new outlets and uses for light products.

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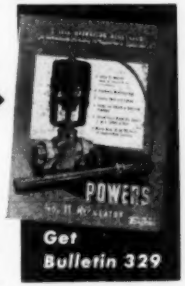

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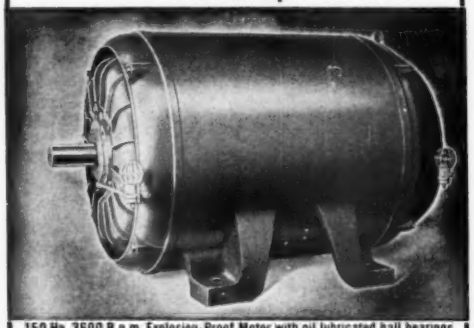

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GULF COAST REFINING CAPACITY

Shows 10-Year Gain of Nearly Million Barrels

by R. B. Tuttle

OVER the 10-year period from 1939 to this date the crude-oil refining capacity in the Gulf Coast areas of Texas, Louisiana, Alabama, and Mississippi has increased by 945,800 bbl. daily. The total capacity rating for all refineries now operating within this area is 2,076,950 bbl. per day. This is 83.6 per cent above 1939. During the 10-year span the number of operating refineries has increased from 42 to 50. Average capacity of all plants in the region 10 years ago was nearly 27,000 bbl. daily whereas an average on the current setup runs slightly more than 41,500 bbl. per day. Greatest capacity gains for any one year in the period is for 1948-1949 when the increase was 194,000 bbl. daily, approximately one-fifth of the gain since 1938.

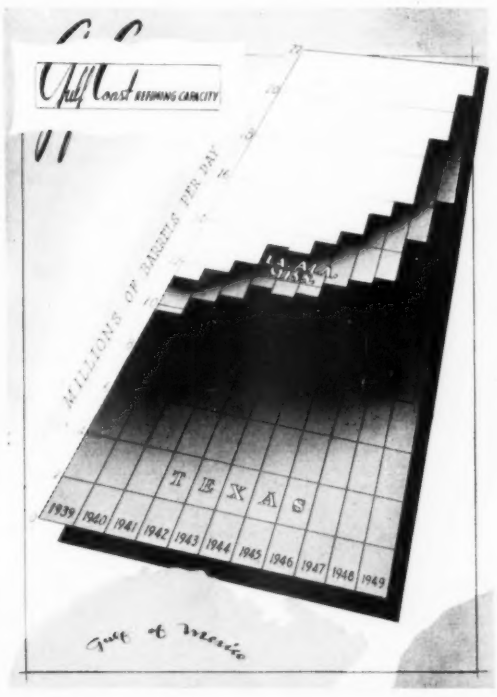
In 1939 fewer than 10 refineries in the Gulf Coast area were equipped with lubricating-oil-manufacturing facilities. Now 15 refineries are so equipped. All of these installations plus one 100 per cent lube-oil plant have a combined producing capacity of 64,105 bbl. per day.

The 100 per cent lube-oil plant is the project of Citcon Corp. which is now under construction near Lake Charles, La. Completion of this 6,000-bbl.-daily plant is scheduled for later this year. The 15 refineries produced finished stocks at an average rate of 50,000 bbl. daily in the early months of this year. Lube-oil production in 1939 from the Gulf Coast area averaged approximately 27,250 bbl. per day, or 54 per cent of current manufacturing rates.

Compared on a national basis, refining operations in the Gulf Coast area comprises 31.7 per cent of the industry's 1949 crude-oil processing capacity. In 1939 the ratio of Gulf Coast operating refining capacity to that of the entire United States was 27.1 per cent. Capacity of the 10 nonoperating refineries in the area 10 years ago was approximately 13,500 bbl. per day total or 10 per cent of the nation's total at that time. All of these shutdown plants were small with two of the largest having capacity ratings of 3,500 bbl. daily each. Only one of the 10 refineries in the shutdown group of 1939 was equipped to produce lube oils.

Including the all-lube plant of Citcon Corp., approximately one plant in every three now operating in the Gulf Coast region has lube-oil-manufacturing facilities. Most of the processes employed are of the very latest types developed for the manufacture of a wide variety of high-quality lubricating-oil stocks. During recent months equipment has been added to modernize lube-processing facilities in some of the refineries. The Shell Oil Co., Inc., refinery near Houston which was built in the late twenties only recently was equipped with lube-oil-manufacturing facilities. This plant, rated at 2,800 bbl. daily production of various lubricating oils, was built at a cost of $20,000,000. Charging stock for the new plant is supplied from the refinery's skimming operations. The major processes included in the new lube-plant operations are vacuum distillation, propane deasphalting, phenol extraction, dewaxing, and contact filtering.

The processing set up at Citcon's new plant incorporates vacuum fractionation, furfural refining, Duo-Sol treating, M.E.K. dewaxing, and clay treating. Charging stocks for this all-lube plant will be supplied from the operations of Cities Service Refining Corp.'s 120,000-bbl.-daily refinery nearby. Selected Louisiana, Arkansas, and East Texas crude oils will be processed to supply charge stocks for operations at Citcon.



Esso Standard Oil Co. has expanded recently its lube-oil-manufacturing facilities. The principal units involved in Esso's new lubricating-oil operations are a new 9,500-bbl. daily vacuum distillation unit, a M.E.K. dewaxing plant, and expansion and modernization of existing facilities. Waxy-distillate pressing capacity at the refinery at Baton Rouge has been increased and facilities for canning motor oils has been increased from 100,000 to 300,000 cases per month.

Facilities for lube-oil production has been increased at the Beaumont refinery of Magnolia Petroleum Co. The major items involved in Magnolia's operations included two vacuum units and dewaxing and solvent-extraction plants. Rating on the two vacuum distillation units is 9,500 bbl. per day. The solvent-extraction unit is designed to operate at 3,300 bbl. daily and the throughput on the dewaxing operation is scheduled at 4,100 bbl. per day.

Expansion of the lube-processing equipment by The Texas Co. at its Port Arthur refinery is designed to up 1948 production capacity by 2,500 bbl. per day. On a nominal basis production capacity on lubes at this refinery will run to 16,000 bbl. daily.

Lubricating-oil operations in the refinery of Humble Oil & Refining Co., at Baytown, Tex., will employ a new 7,000-bbl.-per-day solvent-extraction unit by early 1950. Currently Humble's lube-producing capacity is rated at 12,200 bbl. daily.

Gulf Oil Corp., one of the larger lubricating-oil producers in the Gulf Coast area, operates its various facilities to manufacture lubes at an estimated rate of 12,000 bbl. daily. Processing equipment at this refinery includes furfural, Duo-Sol, and M.E.K. units. Crude-oil-charging capacity of Gulf's Port Arthur refinery is rated currently at 230,000 bbl. per day.

Operations at the 85,000-bbl. Houston refinery of Sinclair Refining Co. includes 3,500 bbl. daily capacity for lube manufacture. This refinery has been operating for a number of years an atmospheric - vacuum distillation unit especially designed to produce certain types of lube-oil cuts. The Sinclair plant is also equipped with M.E.K. dewaxing, phenol treating, propane deasphalting, and other processes for lube manufacture.

Catalytic cracking capacity in the Gulf Coast area for 1949 is rated at 561,300 bbl. daily, more than 38 per cent of all cat cracking capacity in the United States. This capacity represents the total of 17 plants in the area and includes nearly every type of process commercially available. The largest cat cracking capacity for any one refinery is in the Lake Charles plant of Cities Service where three fluid-type units are installed. Combined capacity of these three units on a nominal basis is 85,000 bbl. daily. Capacity of Esso Standard catalytic cracking facilities is rated at 84,500 bbl. per day. Capacities in the other 15 refineries range downward from 63,000 to 5,000 bbl. daily.

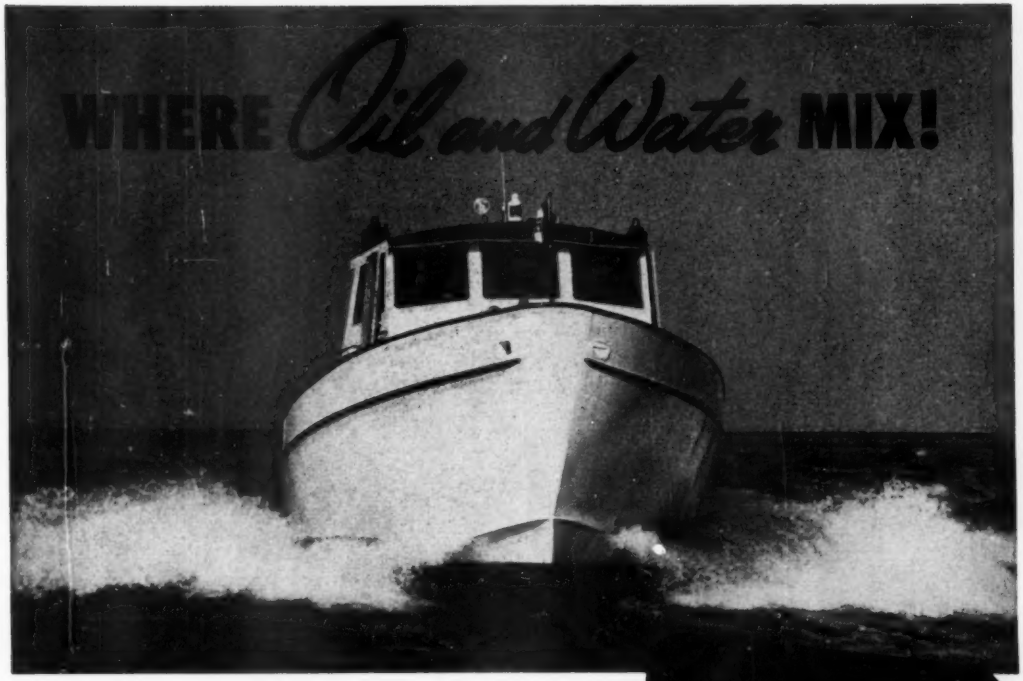
Thermal cracking, vis-breaking, and reforming-capacity ratings on the installations in 22 of the 50 refineries in the Gulf Coast area total 576,400 bbl. per day. No thermal cracking or other similar equipment is incorporated in the operations of the 28 other refineries in this area. Polymerization operations are included in operations of 10 refineries. The combined production capacity of these 10

SUMMARY TABLE ON GULF COAST REFINERY CAPACITIES

	No. of refineries	Crude-oil capacity, bbl. daily	Thermal cracking capacity, bbl. daily	Catalytic cracking capacity, bbl. daily
Texas:				
Houston area	15	802,800	229,500	193,600
Southwest area	9	24,700	2,300	
Corpus Christi area	6	88,500	18,500	10,000
Beaumont-Port Arthur area	6	705,000	229,800	188,200
Total	36	1,621,000	480,100	391,800
Louisiana:				
Lake Charles area	3	131,000	15,000	85,000
South Central area	2	1,800		
Baton Rouge	1	235,000	48,500	84,500
New Orleans area	6	75,650	32,800	
Total	12	443,450	96,300	169,500
Alabama:				
Mobile	1	8,000		
Mississippi:				
Sandersville	1	4,500		
Total Gulf Coast	50	2,076,950	576,400	561,300

TEXAS GULF COAST

Company and refinery location—	Refinery type	Crude-oil charge, cap. bbl. per day	Thermal cracking, cap. bbl. per day	Catalytic cracking, cap. bbl. per day
HOUSTON AREA				
Alamo Refining Co.: Sweeney	CD-C	45,000		*11,000[1]
Crown Central Petroleum Corp.: Houston	CD-C-L	26,000	‡8,500	15,000[3]
Eastern States Petroleum Co., Inc.: Houston	CD-C-A	40,000	§30,000	8,000[1]
Eddy Refining Co.: Houston	CD	2,200		
Hamman Oil & Refining Co.: Bay City	CD-W	2,100		
Humble Oil & Refining Co.: Baytown	Comp.	255,000	††83,500	57,600[1]
Hutex Oil & Refining Co.: Hardin	CD	1,000		
Maritime Oil Co.: Houston	CD	5,000		
Pan American Refining Corp.: Texas City	CD-C	114,000	(£)	†27,000[1]
Petrol Refining, Inc.: Texas City	CD-C	50,000		10,000[2]
Republic Oil Refining Co.: Texas City	CD-C	35,000	§14,500	15,000[1]
Shell Oil Co., Inc.: Houston	Comp.	110,000	‡46,000	25,000[1]
Sid Richardson Refining Co.: Texas City	CD-C	25,000	**5,000	5,000[4]
Sinclair Refining Co.: Houston	Comp.	85,000	†42,000	20,000[2 5]
Stone Oil Co.: Texas City	CD	7,500		
SOUTHWEST AREA				
Bennett Oil & Refining Co. of Texas: Refugio	CD	1,500		
Coastal Refineries, Inc.: Port Isabel	CD-C	7,000	*1,500	
Danaho Refining Co.: Pettus	CD-C	3,000	800	
McBride Refining Co.: La Blanca	CD-L-A	2,500		



Wherever the problems of oil production and water transport are combined . . . where rapid, efficient movement of personnel and equipment saves time, money and tempers . . . sturdy work boats like these new Fellowscraft 60-footers are all-important. Good looking, but not fancy; they're fast and rugged personnel boats built for an overseas petroleum operation where shoal draft and a large capacity are essential.

Whatever your boat design or building problem, Fellows and Stewart's half century of know-how can be of help. We'd like to hear from you.

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TERMINAL ISLAND, CALIFORNIA

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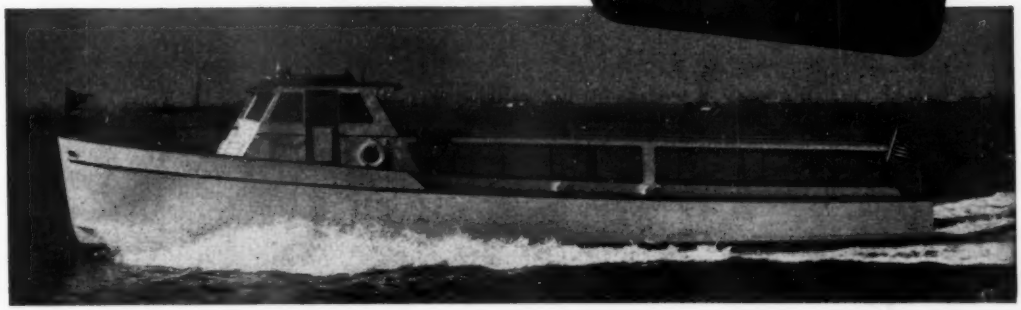
60'

PERSONNEL BOAT

Designed by Dair N. Long

Dimensions: Length OA 60', Beam 16', Draft 3'
Construction: Welded steel hull
Power: Twin General Motors Diesels Model 671, 2 to 1 Reduction Gears
Federal Propellers
Capacity: 81 Passengers
Cruising Speed: 14½ M.P.H.



MOVING COST - $400

Harry Webster and Boyd McIntyre of McIntyre and Webster, Drilling Contractors at Edmonton, Alberta.

"Cardwell" Trailerig can be rigged-up and drilling in less than four hours.

The Trailerig "floats" on 16 heavy-duty tires.

Trailerig with two Caterpillar D13000 engines. Note compact design and full visibility for operator.

EXCLUSIVE CONNECTION WITH WESTERN UNION CABLE SERVICE — FORM 6102

CANADIAN NATIONAL TELEGRAPHS

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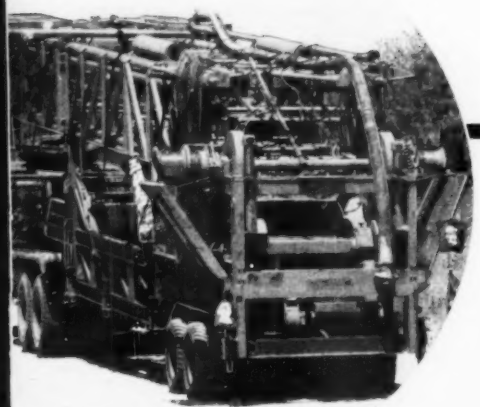
CARDWELL MFG. CO., INC.
WICHITA, KANSAS, U. S. A.

"CARDWELL" TRAILERIG DOING A WONDERFUL JOB. COMPLETED FIRST WELL ROYALITE REDWATER #8-15 WITHOUT A HITCH. MOVED RIG TO SECOND LOCATION OVER SOFT PLOUGHED GROUND. TOTAL COST FIRST MOVE LESS THAN FOUR HUNDRED DOLLARS. NOW DRILLING AT TWENTY-FOUR HUNDRED FEET FIVE DAYS AFTER SPUDDING IN. SHOULD COMPLETE IN RECORD TIME.

McINTYRE AND WEBSTER



"Cardwell" Trailerig whips the high-moving and rig-up costs and drills wells as fast as rigs that cost ⅓ to ½ more.

The Trailerig combines a full scale 5,000-foot double drum draw works with a 90-foot mast. When in the roading position, the entire rig is only 8 feet wide, 13½ feet high and 59 feet long. All drives are equipped with "Cardwell" Air Disc friction clutches to provide fast, smooth control.

Our new catalog gives complete information—send for it and see how the Trailerig fits your job.

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WHEN IT'S A "CARDWELL," THERE'S NO EQUAL IN QUALITY

Company and refinery location—	Refinery type	Crude-oil charge, cap. bbl. per day	Thermal cracking, cap. bbl. per day	Catalytic cracking, cap. bbl. per day
Mex-Tex Oil Co.:				
Rio Grande City	CD	200		
Rado Refining Co.:				
McCallen	CD	3,000		
Rosewood Oil & Refining Co.:				
Bishop	CD	3,000		
Three Rivers Refinery:				
Three Rivers	CD-L-A	1,500		
Winnsboro Refining Co.:				
Winnsboro	CD	3,000		
CORPUS CHRISTI AREA				
American Mineral Spirits Co.:				
Corpus Christi	CD	12,000		
Great Southern Corp.:				
Corpus Christi	C		4,000	
Pontiac Refining Corp.:				
Corpus Christi	CD	20,000		
Sinclair Refining Co.:				
Corpus Christi	CD-C	16,000	†11,500	10,000[2]
Southwestern Oil & Refining Co.:				
Corpus Christi	CD	10,000		
Taylor Refining Co.:				
Corpus Christi	CD-C	22,500	*3,000	
BEAUMONT-PORT ARTHUR AREA				
Atlantic Refining Co.:				
Port Arthur	CD-C	40,000		19,000[1]
Gulf Oil Corp.:				
Port Arthur	Comp.	230,000	†84,800	34,000[2 3]
Magnolia Petroleum Co.:				
Beaumont	Comp.	150,000	‡12,800	¶62,400[2 4]
Pure Oil Co.:				
Nederland	CD-C	55,000	†15,200	9,800[1]
Texas Co.:				
Port Arthur	Comp.	190,000	†117,000	63,000[1]
Port Neches	CD-A	40,000		

*Gasoline capacity. †Operations include polymerization process. ‡Includes reforming operations. §Includes vis-breaking operations. ¶Total charge basis. ‖Includes capacity under construction. £Thermal cracking operations in combination with crude-oil processing. **Unit operated either in catalytic reforming or catalytic cracking service.

LOUISIANA GULF COAST

LAKE CHARLES AREA				
Citcon Corp.:				
Lake Charles	L	(*)		
Cities Service Refining Corp.:				
Lake Charles	CD-C	120,000	¶10,000	85,000[1]
Continental Oil Co.:				
Westlake	CD-C	11,000	†15,000	
SOUTH CENTRAL AREA				
Evangeline Refining Co.:				
Jennings	CD	1,000		
Southern States Refining Co.:				
Eola	CD	800		
BATON ROUGE				
Esso Standard Oil Co.:				
Baton Rouge	Comp.	235,000	†‡§48,500	84,500[1]
NEW ORLEANS AREA				
Beraux Bridge Oil Refining Co.:				
Anse La Butte	CD	650		
Chalmette Petroleum Corp.:				
Chalmette	CD-C	11,500	†6,500	
Clarks' Refinery Division of Peco Corp.:				
Marrero	CD-C	5,000	3,000	
Gilcrease Oil Co.:				
Arabi	CD	4,000		
Pan American Refining Corp.:				
Destrehan	CD-A	9,500		
Shell Oil Co., Inc.:				
Norco	CD-C-A	45,000	†‡23,300	

*Lube refining only; processes semifinished stocks. †Operations include polymerization process. ‡Includes reforming operations. §Includes vis-breaking operations. ¶Includes recycle.

SOUTH ALABAMA				
Coastal Petroleum Corp.:				
Mobile	CD	8,000		
SOUTH MISSISSIPPI				
Southland Oils, Inc.:				
Sandersville	CD-A	4,500		

Key to refinery type: CD—Crude distillation. C—Cracking. A—Asphalt. L—Lubricating oils. W—Waxes. Comp.—Complete.

Key to catalytic cracking symbols: (1) Fluid process. (2) Houdry process. (3) Thermofor process. (4) Perco process.

polymerization installations is approximately 15,000 bbl. daily.

Reforming facilities are installed in 10 of the various refineries now operating in the Gulf Coast region. Capacities on the different reforming units in this group range from 1,000 to 17,000 bbl. per day. On a nominal basis capacity of this reforming equipment is 73,750 bbl. daily. Vis-breaking processes are installed in three of the Gulf Coast plants. Capacity on these processes is rated at 41,000 bbl. per day.

Twenty-one refineries in the Gulf Coast group are equipped with thermal cracking processes. Capacity of these processes totals 461,650 bbl. daily. This total plus the 73,750 bbl. per day of reforming and the 41,000 bbl. daily of vis-breaking operations make up the total of 567,400 bbl. per day capacity given in the accompanying summary table on Gulf Coast refineries. Some of the plants are operating alkylation processes which were built during early and later war years. Estimated capacity on alkylation units now in operation is between 5,000 and 7,000 bbl. per day.

Modernization and expansion of existing facilities is under way in seven of the Gulf Coast refineries. Although many expansion programs were only recently completed in a number of refineries in this area, work at these seven plants and at the new project of Citcon is moving ahead. When these projects plus those now in the planning stage for other plants in the region are in operation, the Gulf Coast section will be well out in front of its present position as the nation's No. 1 refining area.

GULF COAST REFINERIES PRODUCING LUBES

Company and location—	Capacity,* bbl./day
Texas	
Crown Central Petroleum Corp., Houston	500
Gulf Oil Corp., Port Arthur	†12,000
Humble Oil & Refining Co., Baytown	12,200
Magnolia Petroleum Co., Beaumont	3,300
McBride Refining Co., Inc., La Blanca	75
Shell Oil Co., Inc., Deer Park	2,800
Mex-Tex Oil Co., Rio Grande City	30
Sinclair Refining Co., Houston	3,500
Texas Co., Port Arthur	16,000
Three Rivers Refinery, Three Rivers	700

*Nominal basis. †Estimated.

Louisiana	
Citcon Corp., Lake Charles	*6,000
Esso Standard Oil Co., Baton Rouge	7,000

*Under construction.

Totals on Lube Capacities	
Texas	51,505
Louisiana	13,000
Total Gulf Coast	64,105

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New Control Lab Completed At Shell's Deer Park Refinery

Over-all view of the new $1,000,000 control laboratory at Shell Oil Co.'s Houston refinery

A NEW $1,000,000 control laboratory has recently been completed by Shell Oil Co., Inc., at its Houston refinery, Deer Park, Tex. The new two-story lab is designed to facilitate control of refinery operations as well as to increase process efficiency and product quality, and represents the most recent completion of a series of projects embodied in the refinery's $33,000,000 postwar expansion program.

The new laboratory incorporates the function of Shell's product application department, which studies the performance of the approximately 1,050 different products which Shell manufactures, and, in addition, has a separate knock-testing laboratory for evaluating special gasoline blends and processes in all types of knock-test engines.

The laboratory, which is headed by Dr. J. B. Harkness and requires a personnel complement of 150, is completely departmentalized for routine testing and experimental investigation to assure state and federal acceptance of the effluent as well as to minimize oil losses and achieve efficient byproduct recovery.

The inspection division is responsible for uniformity of operations and the high quality of all Shell products. All shipments leaving the refinery are tested against Shell's own specifications. Two streamlined testing lanes in a large room handle all routine inspections while individual rooms are provided for tests requiring special equipment or testing conditions.

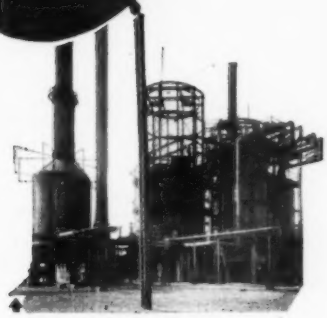
The technical division houses chemists for both the physical-chemistry and analytical-experimental laboratories. These laboratories are fully equipped for the exacting chemical and analytical work carried on. The departments are supplied with all chemicals, equipment, and maintenance work necessary through a separate maintenance and supplies section.

An entirely separate maintenance and supplies section is part of the control lab, thereby insuring the availability of all chemicals and equipment as well as handling and building equipment maintenance. This maintenance section supervises the several craftsmen such as mechanics, pipe fitters, electricians, and instrument men required to operate the laboratory.

The effluent control department occupies 600 sq. ft. in the right transept for routine testing and experimental investigation to assure state and federal acceptance of the effluent as well as minimize oil losses

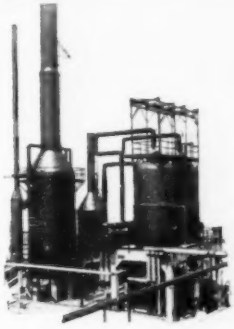
Chief chemist at the control laboratory is Dr. John B. Harkness, shown here, seated in the center, with his assistants, left to right, W. A. Enderson, I. L. Smith, and Q. C. Stansberry

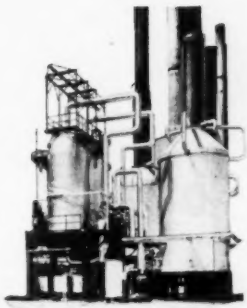
5 More PERCO* Units



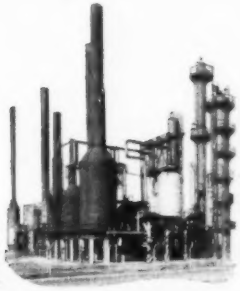
WOOD RIVER OIL & REFINING CO., INC., Hartford, Ill. – 10,000 B/D Straight Run and Cracked Gasoline Reforming and Gas Oil Cracking.

KANOTEX REFINING COMPANY, Arkansas City, Kansas – 4,200 B/D Straight Run and Cracked Gasoline Reforming.



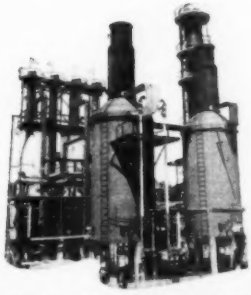


NATIONAL COOPERATIVE REFINERY ASSOCIATION, McPherson, Kansas – 5,000 B/D Straight Run and Cracked Gasoline Reforming.



BARECO OIL COMPANY, Wichita, Kansas – 4,000 B/D Straight Run and Cracked Gasoline Reforming.

engineered by KOCH



ROOSEVELT OIL & REFINING CORP., Mt. Pleasant, Michigan – 3,000 B/D Straight Run Gasoline Desulfurization Reforming.

5 more refiners are far ahead in the octane race because they chose Perco catalytic reforming units. With Perco units they can upgrade the leaded octane ratings of their gasolines by 6 to 8 numbers or more. Regardless of size, these Perco units cost less and are far more flexible than thermal reforming units. The economical design of a Perco unit requires years of "know how" – the kind of experience Koch has obtained by building many more Perco units than any other company. We will be glad to tell you how much a Perco unit will cost and what it will do for you . . . no obligation. *Write us, today.*

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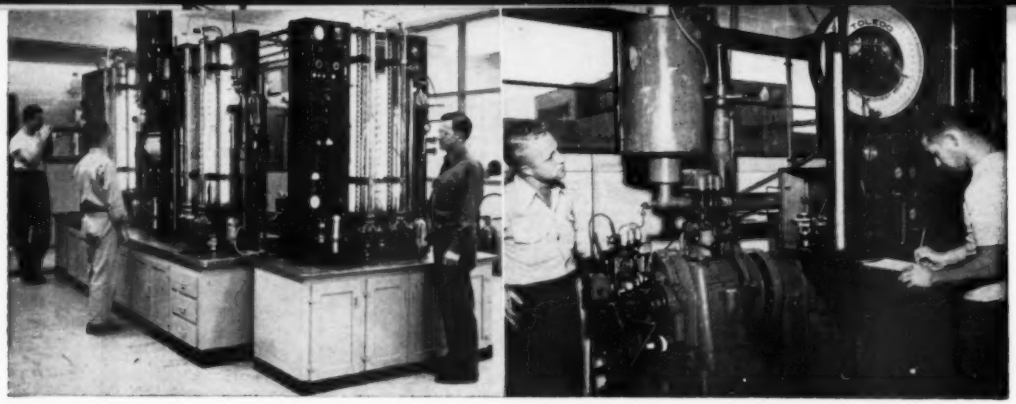

Left: Testers V. A. Reichardt, M. E. McNeil and W. E. Jensen are operating three of the "Pods" to test petroleum gases. Right: Special testers J. B. Floyd and J. F. Lee operate one of the aviation-gasoline test engines

and achieve efficient byproduct recovery.

The knock-testing laboratory occupies a separate building some 100 ft. directly behind the inspection division wing. It contains a separate engine-maintenance shop and individual soundproof rooms for each engine. All of the standard knock-test engines are available with two types for motor gasoline, two for aviation gasoline, and one for diesel fuels.

The technical division which occupies the left wing of the main building is under the direction of a technologist with separate chemists-in-charge of the physical-chemical and analytical-experimental laboratories.

(Continued on page 351)

Special tester Nellie McDowell prepares a lube-oil sample to test its oxidation stability. Glass tube containing the sample will be placed in the Continental oxidation bath

OIL MEN... on the Gulf Coast . . .
Nation-Wide . . . World-Wide

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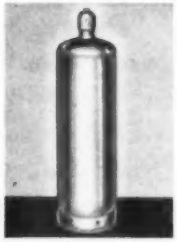

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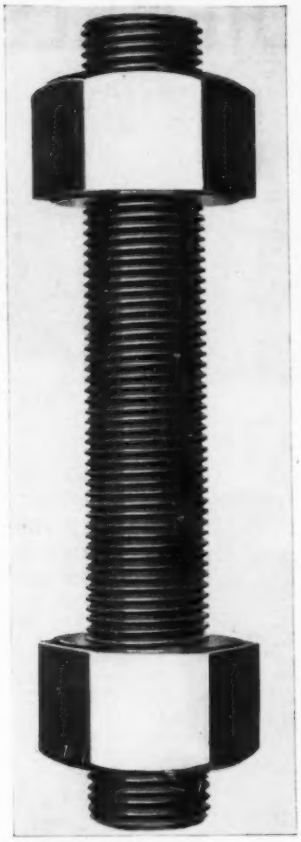

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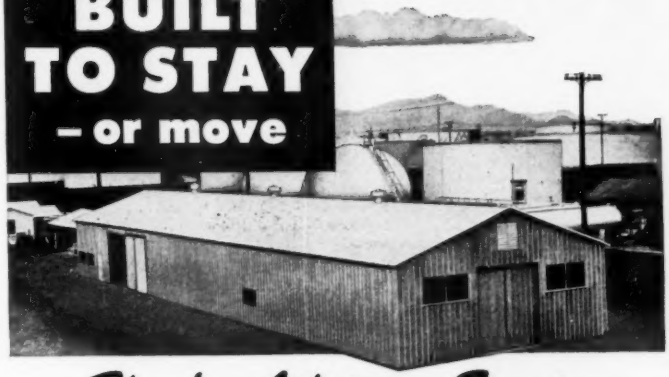

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POWER

...for TOUGH Oil Field Jobs

The New "Dual NH" Cummins Dependable Diesel Hydraulic Power Unit, designed and assembled by Cummins Sales & Service, Inc., is another step in the long battle to make internal combustion engines more FLEXIBLE for oil field operation.

This assembly incorporates latest mechanical engineering principles ... all of them thoroughly proven in the oil fields. It tends to overcome inadequate torque at starting speeds, and assures smoother operation, giving "cushioned power" by use of fluid couplings and air clutches between the engines and the driven members.

Extremely simple, both in principle and mechanics, these couplings reduce the problem of maintenance, wear and breakdown practically to zero.

Many years of "oil field power" specialization have equipped Cummins Sales & Service, Inc., with valuable knowledge and application experience. The new NH-Hydraulic power unit is an outgrowth of this experience and knowledge of problems involved.

The "Dual NH" Cummins Dependable Diesel Hydraulic Power Unit is the answer to the tough power jobs always present in the oil fields because it offers greater economy and efficiency.

The new Cummins "Power Team" also is available with a mechanical drive for use with torque converter. This assembly also uses Fawick 14" Airflex Clutches.

THE CUTAWAY ILLUSTRATION SHOWS THE HYDRAULIC COUPLING AND THE AIR CLUTCH ASSEMBLY. OIL PUMPS DRAW THE OIL FROM THE BASE OF THE WELDEX CASE AND FORCE IT THROUGH THE SHAFT AND OUT PASSAGES TO THE CHAIN SPROCKET. THIS UNIT CONSISTS OF TWO SIX CYLINDER, FOUR-CYCLE CUMMINS NH-600 DEPENDABLE DIESEL ENGINES, TWO FAWICK AIRFLEX CLUTCHES, AND TWO TWIN DISC HYDRAULIC COUPLINGS.

Cummins Dependable Diesel Engines have been doing an outstanding job in the oil fields since 1934. Four factors have been all-important in their success. **First,** Cummins Dependable Diesels are precision built, carefully engineered, and designed to incorporate the outstanding and exclusive Cummins Fuel System. **Second,** the "ever-ready" service set-up maintained by Cummins Sales & Service, Inc., exclusive distributors in the oil fields. **Third,** a variety of models (39) to meet every power need. **Fourth,** availability of immediate delivery on engines and parts from stocks in Cummins Sales & Service, Inc., branches.

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Distinctive Construction Features Characterize Gulf Coast Pipe-Line Operations

by Paul Reed
Pipe-Line Editor

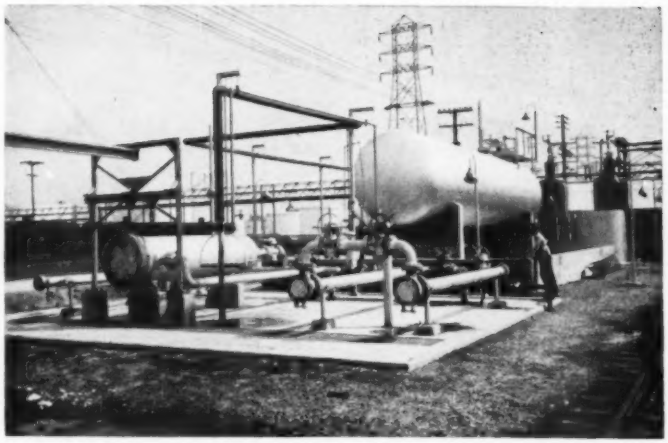
IN pipe lining, the conditions of the Gulf Coast have not only resulted in large-scale projects but also in certain distinctive features which are characteristic of this seacoast area with large oil and gas reserves and great concentration of refining facilities.

The most extensive construction in the United States of lines as large as 30 in. is represented by a total of 810 miles recently laid or about to be laid on the Gulf Coast, including the 210 miles of 30 and 31-in. completed in recent months for Tennessee Gas Transmission Co. and by the 600 miles of 30-in. about to be laid as the start of the 1,840-mile Transcontinental Gas Pipe Line Corp. line to New York City.

To obtain more economical handling of such big-inch pipe being delivered in 31½-ft. joints, Fish Constructors, Inc., in charge of Transcontinental construction, has been developing techniques for yard double jointing which promise to speed up pipe-laying progress 15 per cent and to reduce field welding 50 per cent, with an ultimate saving of several million dollars in the entire $190,000,000 project. At experimental double-jointing operations contracted by Fish in Mississippi, the practice followed has been to run a stringer bead by rod welding with the pipe stationary, followed by submerged arc welding with the pipe rotated. Special equipment has been developed to facilitate handling pipe in such operations.

Offshore Pipe-Line Methods

Offshore pipe-line construction methods are being planned for serving production in the Gulf of Mexico. The first actual offshore pipe lining is now being undertaken for the laying of a 3-mile, 4-in. crude-oil line for the California Co. from a point in the Leesville, La., area. The longest submarine pipe line in the Gulf Coast seawater in Lavaca Pipe Line Co.'s 13-mile, 8-in. natural-gas line laid in recent months in Matagorda Bay, in the construction of which, methods were demonstrated which may be adaptable to deeper water. The procedure has consisted of welding 1,000-ft. sections on land prior to joining a 5,000-ft. section towed seaward and added to the part of the line already laid. For this operation, use was made of a war-surplus L.S.T. converted to a pipe-laying craft.



Shell Pipe Line Corp. terminal of products pipe line at Deer Park, Tex., where shipments are received from cycling-plant operations at Sheridan for delivery to refinery of Shell Oil Co., Inc.

Within recent weeks, construction has been in progress on a "rampless ramp barge" intended for service eventually in laying Gulf Coast offshore lines. This barge, another war-salvage L.S.T., will have a large steel frame above deck for several traveling cranes which will hold three joint sections in position while they are being welded to the part of the line already in the water. At the bow of this craft pipe will be held during welding by two pipe-line cradles suspended from a special A-frame. The present scale of exploration operations suggests that the time is approaching when pipe lines may be laid 25 and 30 miles offshore in the gulf.

Protection of pipe lines from attacks of marine life is expected to be afforded to a large extent by the fact that the offshore lines in the gulf will lie deep in the soft seabottom material. Effective cathodic protection of offshore lines will be possible with installation of bare magnesium anodes. One such submarine anode will protect a larger surface of steel in seawater than in most soil; in doing this the anode will have a shorter life. A single anode will deliver 3 to 5 amp. in salt water, while in low-resistant soil and fresh water, delivery is in the 1/10 to ½-amp. range.

In connection with submarine pipe lining, it may be mentioned that 10-in. cast-iron pipe has been in submarine natural-gas-transmission service for more than 10 years from the Texas City area to Galveston Island. This is the longest cast-iron pipe line in trunk-line service for the industry.

The industry's only submarine pipeline tunnel is the unique project constructed by Sinclair interests under the Houston Ship Channel in 1931 by subway construction methods. It has contained lines of other companies on a lease basis as well as those of Sinclair. This is a level concrete tunnel 680 ft. long with flat floor; distances from top to bottom and side to side are 8 ft. It lies 66 ft. below mean low tide and is reached by 10-ft. i.d. vertical shafts: 82 ft. deep at the south end; 77 ft. at the north.

For several reasons a practice has been followed of keeping the tunnel filled with fresh water to: (1) mitigate corrosion which would occur with intrusion of salt water; (2) prevent fire or explosion; (3) to minimize any tendency of the tunnel to contract or expand.

Gulf Coast pipe-line systems for crude oil, products, and natural gas have certain characteristics which have resulted in unusual terminal facilities.

1. Several major crude-oil systems

from New Mexico, Texas, Oklahoma, Arkansas, and Louisiana converge at pipe-line company storage terminals in the Houston-Beaumont area. From these great terminals crude-oil deliveries are pumped to refineries at a distance of several miles. This differs from the common practice elsewhere of making trunk-line deliveries to refineries. Examples of these great pipeline storage terminals are the facilities of Humble Pipe Line Co. at Webster, Texas Pipe Line Co. and Texas-New Mexico Pipe Line Co. near Houston, and Gulf Refining Co. (Houston Pipe Line Division) at Sour Lake.

However, Humble modified this terminal practice to some extent by providing for having some crude-oil shipments go direct to the Baytown refinery via the 50-mile, 20-in. Satsuma line.

In the postwar period there has been much revamping and expansion of terminal facilities which has led to elimination of manifold housing, construction of more efficient manifold installations either buried in gravel or supported aboveground, modern tankage and station facilities.

Attainment of higher efficiencies through installation of big-inch pipe in order to replace smaller diameter pipe and to reduce operation of pumping facilities has been widespread in the United States in the postwar period. The principal Gulf Coast examples of this modern trend are Texas Pipe Line Co.'s big-inch projects during the past year: (a) 60-mile, 16-in., West Columbia-Houston; (b) 87-mile, 20-in., Houston-Port Arthur.

2. Nearly all Gulf Coast refined-products lines are postwar systems built northward from the Texas seacoast refineries in the Beaumont, Baytown, and Corpus Christi areas. Hearne, Tex., is a notable point for this traffic. At Texas Pipe Line Co.'s refined-products terminal and pump station there deliveries are received from the Beaumont-Port Arthur area via Magnolia Pipe Line Co.'s line. Nearby is Humble Pipe Line Co.'s station and terminal. Both the Texas and Humble systems terminate in the Fort Worth area. Through the Hearne-Bryan area Sinclair Refining Co.'s products line goes from the Houston area on its route via Dallas-Fort Worth area, Kansas City, Chicago, and Detroit to Philadelphia.

Sinclair's products system from Corpus Christi terminates at Austin and San Antonio. The Humble, Magnolia, Texas, and Sinclair products facilities exemplify modern station control practices.

3. The longest and largest-diameter pipe lines running out of the Gulf Coast area are those for the transmission of natural gas to industrial regions of northeastern United States. Significant compressor station practices such as the installation of 1,600-hp. horizontal unit stations of Tennessee Gas Transmission Co. and the development of centrifugal compressors for Texas Eastern Transmission Corp. may be regarded as reflecting broad engineering policies rather than Gulf Coast conditions.

Construction operations on the Gulf Coast are hampered in many areas by swamp conditions requiring special measures. Frequently pipe is dragged across swampy areas in sections which are several thousand feet long.

To facilitate laying in swamps, a larger percentage of trunk and gathering-line pipe is yard coated and wrapped on the Gulf Coast before delivery to construction projects than in other parts of the United States.

Because of the excessive corrosion conditions in swampy areas, the problems of pipe protection have been more serious than elsewhere in the country. Following early attention to this expensive damage, modern techniques of cathodic protection have been extensively developed and applied to Gulf Coast pipe lines.

Gulf Coast Pipe-Line Projects

Company—	Miles	Inch	Status	Contractor, location, and completion date
CRUDE OIL				
Atlantic Pipe Line Co.	382	10	Under way	A. C. Holder.—Refugio-Crane, Tex., 8-31-49.
California Co.	3	4	Under way	Leesville, La., offshore line.
Humble Pipe Line Co.	24	12	Completed	Sheppard-Geiger.—Lytie-Ingleside, Tex., loops, 1948.
Humble Pipe Line Co.	370	16 or 18	Under consideration	West Texas-Satsuma-Baytown, Tex.
Pan American Pipe Line Co.	42	4-6	Completed	Altgelt Const.—Gathering lines, E. and S.W. Texas, 1948.
Sun Pipe Line Co.	61	4-6-10	Authorized	Seabreeze to Sun Station area, Tex.
Sun Pipe Line Co.	26	4-6	Completed	Altgelt Const.—Ross-Garcia; Shanks and Eustace, Canales-La Gloria, Tex., 1948.
Texas Pipe Line Co.	60	16	Completed	Latex.—West Columbia to Houston, Tex., 1948.
Texas Pipe Line Co.	87	20	Completed	Latex.—Houston to Port Arthur, Tex., 1948.
Texas Pipe Line Co.	47	6-10	Under way	Latex, Associated P. L. Contractors, Sheppard-Geiger.—Manvel Sta., Withers Sta., and Markham Sta. areas.
PRODUCTS				
Sinclair Refining Co.	248	6	Completed	O. C. Whitaker.—Corpus Christi-San Antonio-Austin, Tex., 2-1-48.
Sinclair Refining Co.	264	10	Completed	H. C. Price.—Houston-Fort Worth, 5-1-48.
Texas Pipe Line Co.	143	10	Completed	Associated Contr. & Engrs.—Hearne-Dallas, 1948.
Texas Pipe Line Co.	79	8	Completed	Latex.—Hearne-Austin, Tex., 1948.
Texas Pipe Line Co.	28	6	Completed	Latex.—Austin-San Marcos, Tex., 1948.
NATURAL GAS				
Atlantic Gulf Gas Co. (United Gas P. L. Co.)	1,530		Planned	Alabama, Florida, Georgia, South Carolina.
Gulf Coast Northern Gas Co.	1,184	26	Planned	Corpus Christi area to connection with Natural Gas Pipeline Co. of America near Rockford, Ill.
Lavaca Pipe Line Co.	38	2-8	Completed	Continental Const. Co.—Most Matagorda Bay, Tex., area including marine lines, 1948.
Lavaca Pipe Line Co.	18	6	Authorized	Continental Const. Co.—Pt. Comfort-Francitas, Tex., wrought iron line.
Lavaca Pipe Line Co.	3	4-8	Under way	Continental Const. Co.—Matagorda Bay.
McCarthy Oil Co.	100	12-20	Under way	Anderson Bros.—Jackson Pasture-Orange, Tex.
McCarthy Oil Co.	30	6	Completed	Anderson Bros.—Winnie-Port Neches, Tex.
Piedmont Natural Gas Corp.	900	20	Planned*	Upper Gulf Coast area to Danville, Va.
Southern Natural Gas Co.	61	24	Completed	Latex.—Eastern Alabama loop, 1949.
Southern Natural Gas Co.	40	8	Completed	Latex.—Gwinville-Brookhaven, Miss., 1948.
Tennessee Gas Transmission Co.	105	30	Authorized	Louisiana and Mississippi loops.
Tennessee Gas Transmission Co.	210	30-31	Completed	H. C. Price.—Bechtel, El Campo, Tex.-Natchitoches, La.
Texas Eastern Transmission Co.	1,400	26 or larger	Planned	Texas-Pittsburgh looping.
Transcontinental Gas Pipe Line Corp.	1,840	20-26-30	Under way	Rio Grande Valley-New York City.
Trunkline Gas Supply Co.	768	26	Planned	Louisiana-Keokuk, Iowa.
United Gas Pipe Line Co.	93	18	Planned	Baxterville, Miss., Mobile, Ala.

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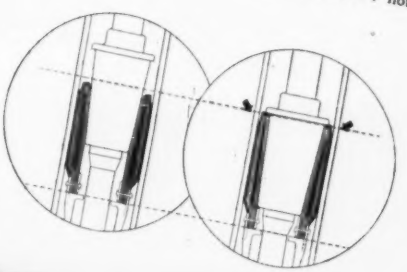

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Stuck Drill Pipe Freed Through Use of Mud Acid

by J. S. Talbot*

THE freeing of stuck drill pipe can require extensive mechanical operations resulting in costly delays to the operator during the drilling of a well. Over the past few years, however, the use of mud acid to free stuck drill pipe has proved to be of considerable assistance in this troublesome problem, particularly in those areas where bentonitic shales are encountered.

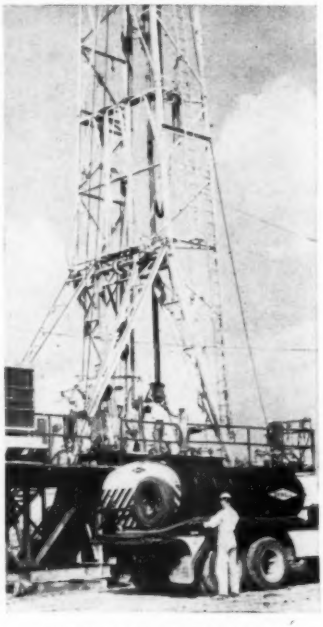
Sticking of the drill pipe may occur going into or coming out of the hole during drilling operations, while making emergency repairs to the drilling equipment, or during fishing operations where the wash pipe or other tools may become so firmly wedged in the hole that still another fishing job can result.

The causes of sticking drill pipe and various methods used in freeing it have been fully discussed by Warren[1] and Hayward[2]. The causes may be briefly described as:

Keyseating is believed to be caused by drill pipe under tension trying to straighten itself in a crooked hole. The rotation of the drill stem and the erosive action of the drilling fluid may cause the drill pipe to cut itself back into that part of the surrounding formation against which it is bearing. Where drill collars or the bit are drawn into such a keyseat, sticking of the pipe can result.

Improper mud control may result in stuck drill pipe if the mud lacks sufficient colloidal properties to retard effectively the settling of cuttings while operations are shut down, or in those sections of the hole where washouts occur. Improper mud control may result in excessively thick mud cakes which can reduce the effective diameter of the hole to the degree that withdrawal of the drill stem may be rendered difficult or impossible. Likewise, loss of water from aqueous drilling fluids into bentonitic shales may cause the shale to heave or slough into the hole, as described by Wade[3].

*Development engineer, Southwest Gulf Coast area, Dowell Incorporated, Alice, Tex.



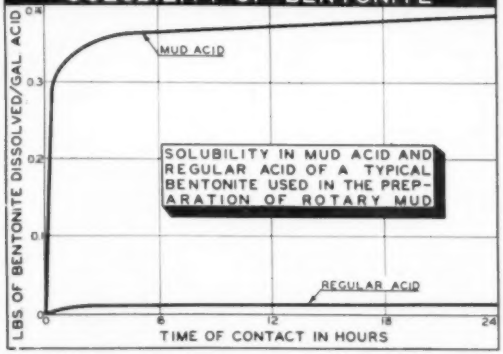
Mud-acid job, South Gulf Coast

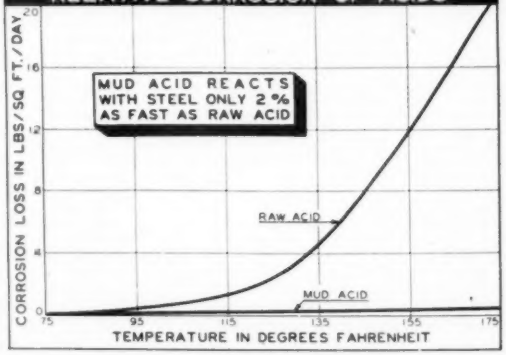
Well cuttings allowed to settle from the mud stream in washouts or caves due to reduced velocity of the effluent drilling mud at such points may cause the drill pipe to become stuck. The tendency for this to happen is increased by the cuttings in the mud stream being filtered out on the underside of the forming bridge to the degree that normal circulation and movement of the drill pipe may become impossible.

Balled-up bits are thought to be one of the principal causes of stuck drill pipe in the Gulf Coast area. When the drilling rate increases to the point where the circulation rate of the drilling fluid is no longer sufficient to remove cuttings from the bottom of the hole or to clean the bit effectively, the bit can become so loaded with the formation being penetrated that rotation or vertical movement of the drill stem becomes difficult or impossible.

This situation is usually encountered while drilling certain soft, sticky shales. In some cases mud circulation may be reduced or stopped as a result of this action, although it appears that in most instances circulation is maintained. A partially balled-up bit may function in a satisfactory manner while making hole, but as it is withdrawn from the hole it may collect cuttings from the mud to the extent that continued withdrawal becomes impossible. In some situations the balled-up bit may be pulled into a tight spot in the hole, causing it to be wedged firmly at that point.

Various techniques have been used to free drill pipe once it is stuck. Many operators prefer to try some method which, if successful, will enable them to remove the drill stem intact without resorting to the time-consuming and expensive process of "washing over and cutting out" or sidetracking junk left in the hole if the washover attempt is unsuccessful. Included in this category of methods





is the use of oil, brines, and acids spotted at points in the hole where the pipe is believed to be stuck.

Fluids, especially oils and acids, have enjoyed considerable use, for reasons of economy and ease of handling. Oil has been used in some areas successfully for this purpose and continues to be used today. Hydrochloric acid was used to some extent for freeing stuck drilling tools before its value as agent for increasing the productivity of oil and gas wells completed in limestone reservoirs became fully evident. A more recent material used in the freeing of stuck drill pipe has been mud acid.

Mud acid is a special mixture with the property of dissolving many of the minerals found in subsurface strata, such as calcium carbonate ($CaCO_3$) and dolomite $CaMg(CO_3)_2$. In addition to these materials, mud acid has the ability to dissolve various clay minerals such as beidellite, illite, kaolinite, montmorillonite, and others. Mud acid also will destroy the colloidal or swelling properties of montmorillonite and similar colloidal clays, if sufficient acid is not available for their complete solution. Mud acid, as described by Cardwell[4], Lehnhard[5], and Kelly[6], also has the property of dissolving or destroying aqueous drilling mud cakes deposited in a drilling well. It follows then, that if drill pipe is stuck by shale, mud cake, or cuttings which are soluble in mud acid or have swelling properties which may be destroyed by mud acid, the drill stem may be freed if these materials are properly exposed to the chemicals.

Mud acid, used in freeing stuck drill pipe, contains special inhibitors and surface-tension-reducing agents. The purpose of the inhibitors is to reduce the corrosive effect of the acid mixture on metal well equipment to a negligible value. In deep wells where high subsurface temperatures are encountered, the effect of the inhibitors in preventing metal corrosion becomes especially important.

The immediate requirements necessary in attempting to free stuck drill pipe with mud acid are that the well must circulate and that the drilling equipment must be in sufficiently good repair so that the pipe may be "worked" by applying and releasing tension while the chemical treatment is in progress. It is also desirable that attempts be made to rotate the pipe while the chemical treatment is under way. Here it should be pointed out that the more pipe is worked after its sticking and before the mud acid treatment is made, the less likely the chemical treatment is to be successful. It is thought that vigorous and prolonged working of the pipe in attempts to free it prior to the use of mud acid may so compact the clays on the bit, or so firmly drive the drill collars or bit into a keyseat or bridge, that the chemicals cannot properly contact the critical sections. The final recourse then must be mechanical removal.

The technique in using mud acid to free stuck drill pipe is relatively simple. The amount of mud acid employed in this type of application is usually 1,000 gal. After shutting down the slush pumps and isolating them from the system, the mud acid is pumped into the drill pipe through the rotary hose, preceded by from 10 to 20 bbl. of water. Water then is pumped into the drill pipe behind the mud acid. After 150 to 250 gal. of acid have been pumped through the bit, the pipe is worked and torque is applied as previously described. After the drill pipe is free, it is rotated and worked up and down as far as the dimensions of the derrick permit in order to clear any tight spots that might exist in the troubled vicinity within the hole.

The water load and mud acid then can be allowed to flow back through the drill pipe as desired, due to the unbalanced column effect created when the drilling mud was displaced from the pipe by the lighter water and mud acid. During the beginning of this reversing procedure, the slush pumps are used to keep the annulus full. Then, after the annulus and drill-pipe columns have become hydrostatically balanced, the annulus must be closed and the process of reversing out completed. It is imperative that no mud acid be left anywhere in the hole or mud-circulating system when normal drilling is resumed. After satisfactory mud returns have been obtained from the drill pipe, circulation is begun in the normal manner.

During the past several years, over 300 successful attempts to free stuck drill pipe, employing mud acid, have been made in the Gulf Coast area alone. Up to the present time, the applications of mud acid for solving this problem average over 75 per cent successful. It is interesting to note that the great majority of these successful attempts were made in areas where limestone formations are either not present or are infrequently encountered. It is generally believed that in most of these cases of stuck drill pipe, the cause was either a balled-up bit or hole-diameter reduction by bentonitic shales, or both.

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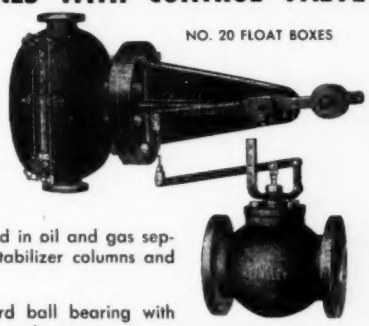

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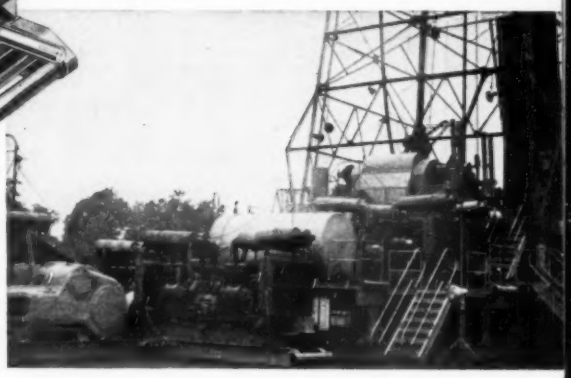

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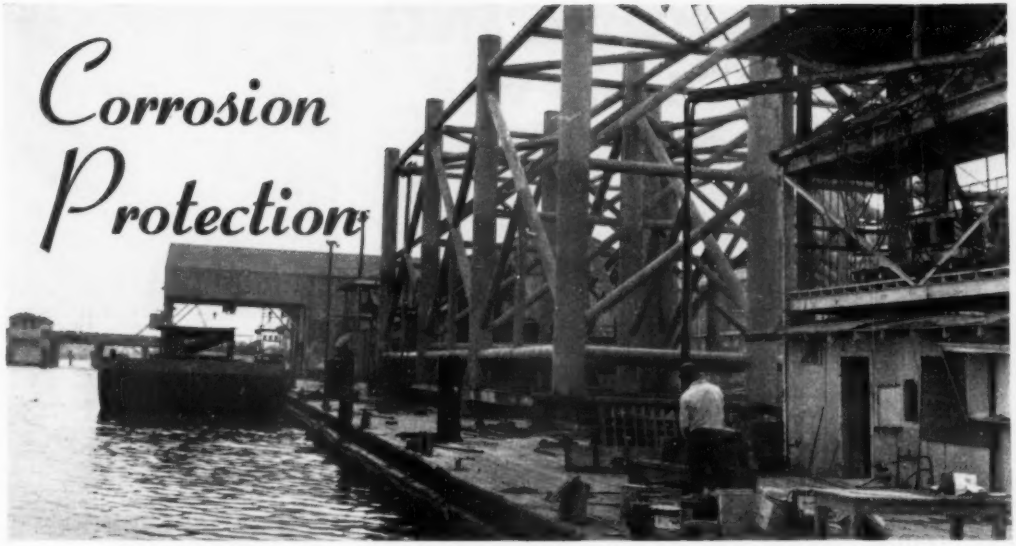


View of prefabricated offshore drilling structure showing maze of trusses and braces subject to corrosion

for offshore drilling structures

by Arthur E. Burns, Jr.*

IT is seldom that a more serious corrosion problem is encountered than that which exists on the offshore drilling structure. Ordinarily where such a problem is confronted in industry it is solved by the use of corrosion-resistant metals or alloys. However, the tremendous weight of the offshore structure completely eliminates anything but steel construction. The rapidity with which improperly protected steel will corrode under these severe marine conditions can hardly be appreciated until it is observed first hand. Protective coatings which have proved effective for land-based operations are seldom suitable for the much more severe conditions offshore.

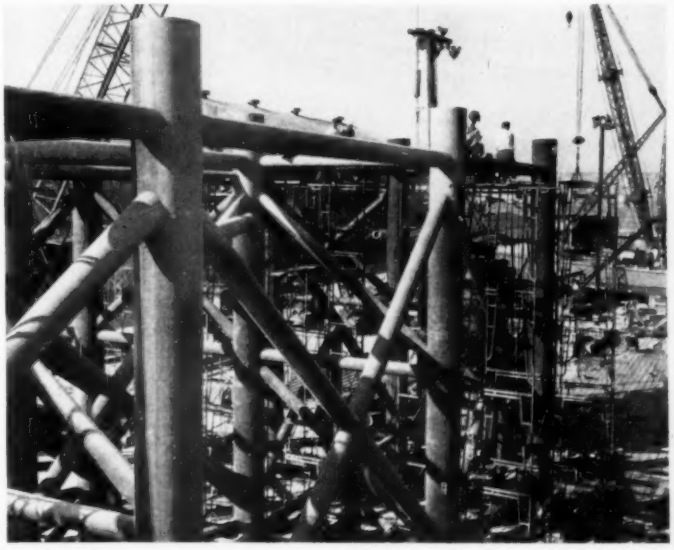
Three Exposure Areas on Offshore Structures

Fundamentally, there are three distinct areas of exposure involved on an offshore structure. These are: (1) the continuously submerged area below the low tide level; (2) the intermittently submerged area below the low and high-tide level; and (3) the area above the high-tide level. Due to wave action, the boundaries between these areas are relatively narrow zones rather than sharp lines. Each of the areas presents distinctly different problems to the corrosion engineer and paint chemist. Paints or coatings suitable for use on one area are frequently entirely unsatisfactory for use on another area.

*Chief chemist, Hart & Burns, Inc., Dallas, and Riverside, Calif. The author is a specialist in paint chemistry, was formerly research chemist for U. S. Navy.

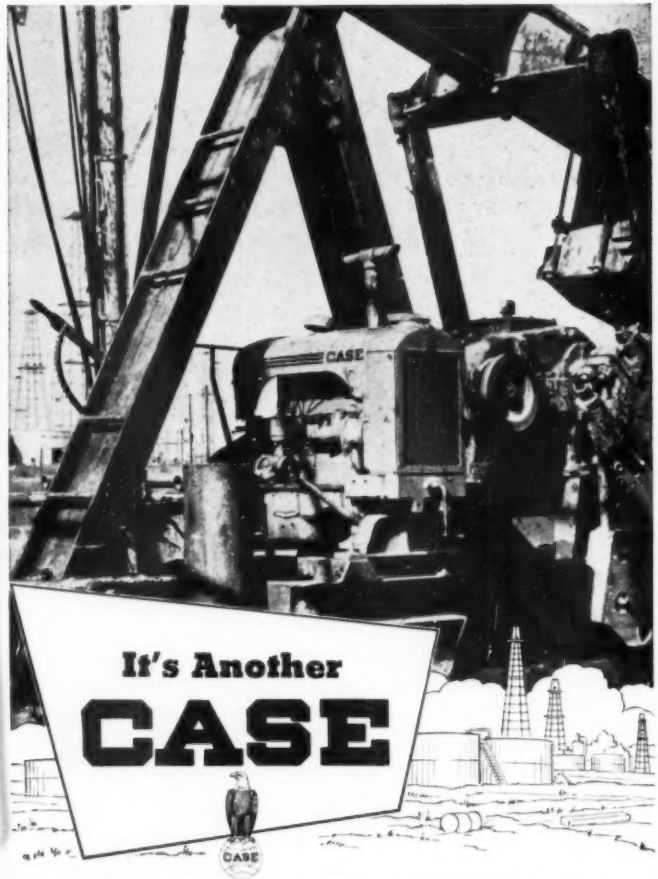
The conditions encountered on an offshore structure are quite comparable to those experienced on an ocean-going vessel where the underwater bottom area, variable draft area, and topside area are analogous to the three distinct exposure areas cited in the previous paragraph. Experience gained in the marine field thus is directly applicable in most instances to the offshore problem. In fact, it constitutes the primary source of data

View in Gulf Coast shipyard of platform structure, as painters begin. Power sprays are used for major part of protective coating application



STEADY PUMPING

. . . on the Gilmore Well



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upon which a solution of the offshore corrosion problem can be based.

Paints and coatings commonly used for protection of steel under atmospheric exposure are entirely unsuitable for use on the continuously submerged area below the low-tide level. As a general rule, the long-oil type of vehicle having excellent resistance to ultraviolet light on atmospheric exposure is a very poor material for under-water use. These materials, which include red lead or zinc chromate primers, and the common drying oil or synthetic top coats, tend to soften badly and to fail rapidly by blistering and loss of adhesion on continuous immersion.

A short-oil or oil-free, high-resin vehicle should be used for underwater work because this type of material retains its adhesion and has much less tendency to blister. The type of vehicle used is usually of greater importance than the specific pigmentation. No single type of pigmentation seems to be outstanding for underwater work.

Fouling Factor

A factor that always must be considered on the underwater area is the problem of marine fouling. The Gulf of Mexico is noted for its high rate of marine fouling. Any offshore structure in this area can be expected to foul rapidly with barnacles unless it is protected with an effective antifouling paint.

Once barnacles attach to a surface, they will rapidly cut through and destroy the effectiveness of any organic paint film. As an example, on net buoys it was found that barnacles would cut completely through a quarter-inch film of hot-mop coal-tar enamel within a few months. This type of film failure seems to result in the development of a serious pitting type of corrosion.

Painting Practice

A painting procedure that has been used on the continuously submerged area of several offshore structures is as follows: (1) Clean the surface mechanically by wire brushing or by the use of pipe-cleaning machines. (2) Apply one coat of brine-resistant underwater primer immediately after cleaning, and preferably before the structure is fabricated. (3) After fabrication of the structure, all welds should be cleaned of flux and spot-primed by brush, and all scraped areas should be spot-primed at the same time to obtain an intact prime coat over the entire area. (4) A second coat of brine-resistant underwater primer should then be applied. (5) Apply a coat of soluble matrix antifouling paint. (6) Follow this by a second coat of antifouling paint not more than a week before the structure is to be erected. The dry film thickness of the two coats of brine-resistant primer should be not less than 4 mils (.004 in.), and the dry film thickness of the two coats of antifouling paint should be not less than 7 mils.

The intermittently submerged area between the high and low-tide level presents the most severe corrosion problem of the entire structure. It is subjected to the same conditions of salt-water immersion and fouling as the continuously immersed area, and in addition, is exposed intermittently to the air and to ultraviolet light. Abrasion and scraping are frequently a problem and the temperature variation on the surface is always much greater than on the continuously submerged area. This tidal-range area does have the advantage, however, that maintenance painting can be done, when necessary, at low tide.

Paints designed for use under water are usually affected adversely by intermittent drying, by ultraviolet light, and by wide temperature variations. Paints designed for use above the waterline usually show even worse failure in the tidal-range area, however, due to the blistering, softening, and marine fouling. For this reason it is generally better to use underwater paints in this tidal-range area rather than topside coatings.

A practical procedure for the tidal-range area would be the same system described previously for the continuously submerged area, consisting of two coats of brine-resistant primer followed by two coats of soluble matrix antifouling paint.

The brine-resistant primer containing a pure Bakelite resin vehicle provides effective resistance to both intermittent atmospheric exposure and salt-water immersion. The antifouling paint will lose its effectiveness more rapidly in the tidal-range area than below the low-tide level. An additional coat of material can be applied when necessary, however, by working on a calm day at low tide.

The procedures described above for the protection of the submerged and tidal-range areas obviously require most careful handling and the use of effective types of paints for these areas. The problem can be simplified by the use of a protective coating that is ideally suited to the service. Such a coating is Catha-Coat, a completely inorganic composition containing an extremely high percentage of metallic zinc. It forms a very hard, gray film that consists essentially of finely divided, pure metallic zinc dispersed in and partially combined with an inorganic matrix. This covering provides effective cathodic protection to the underlying steel due to its high zinc content. Corrosion cannot creep under the film or attach at pinholes or imperfections in the film, as is the case with some other paints immersed in salt water. The material is so hard that barnacles will n t penetrate the film; and for this reason, the need for an antifouling paint is eliminated. At its recommended covering of 150 sq. ft. per gallon the applied film contains about 2.7 oz. of zinc per square foot. In addition to its resistance to salt-water corrosion, Catha-Coat is unaffected by exposure to gasoline, crude oil, and organic solvents that rapidly soften or disintegrate some other paints. It has been used effectively as a protective coating on the submerged and tidal-range area of offshore drilling structures in the Gulf area and has been used to obtain highly satisfactory protection in a number of other similar applications on marine equipment, salt-water-ballasted tanks, and industrial equipment.

Topside Painting

Although the area above the high-tide level presents a serious corrosion problem, it can be protected with marine topside paints. The most important consideration is to provide adequate film thickness for the combined primer-topcoat system. A minimum of four coats is recommended with a dry film thickness of at least 5 mils (.005 in.).

A practical specification would be two coats of marine topside chromate primer followed by two coats of gray marine hull-and-topside enamel. For this type of exposure paint performance is not directly proportional to paint-film thickness but instead, improves more nearly in proportion to the square of the film thickness. Thus, a four-coat system could be expected to have roughly four times the durability of a two-coat system. Present U. S. Navy topside painting specifications call for a minimum four-coat system of the type recommended previously.

Deck surfaces should be protected by marine-type primers and deck paints. Here again, a four-coat system should be used for best results. A recommended specification would be two coats of marine chromate primer followed by two coats of nonskid deck paint. Nonskid deck paint contains 100-mesh pumice and gives a skid-resistant film having excellent abrasion resistance. Interior deckhouse areas may be protected with marine primers and cabin paints.

Maintenance of the accessible areas remains a problem as proper surface preparation is extremely difficult. Painting over corrosion is unsatisfactory because moisture and salt residue is trapped underneath the new paint film. Corrosion soon takes place causing rust to "burn through" the new paint film. This can be avoided by either sandblasting, or by wire brushing and the use of a prepainting treatment such as Pre-Tek. This is a composition designed to penetrate the rust scale, bond to the metal, and replace the moisture and salt residue present in the rust scale. Application of primers and topcoats are recommended after this treatment.

GMV Turboflow Saves Fuel For Big And Little Big Inch

As indicated on this map of the Inch line, 5 of the 7 new stations powered by reciprocating engine-driven compressors are GMV-equipped — a total of 46,900 Cooper-Bessemer V-angle hp.

Of particular significance, the GMVs most recently furnished (29 of the 44 now on the lines) are *Turboflows* — Cooper-Bessemer's latest gas-engine development, affording a full 10% increase in power output while reducing fuel consumption by at least 15%.

Today, more and more of the big gas lines are taking advantage of the new savings made possible by Cooper-Bessemer V-angle Turboflows. Unprecedented fuel economy and increased power output, obviously means big reductions in the overall costs of installation.

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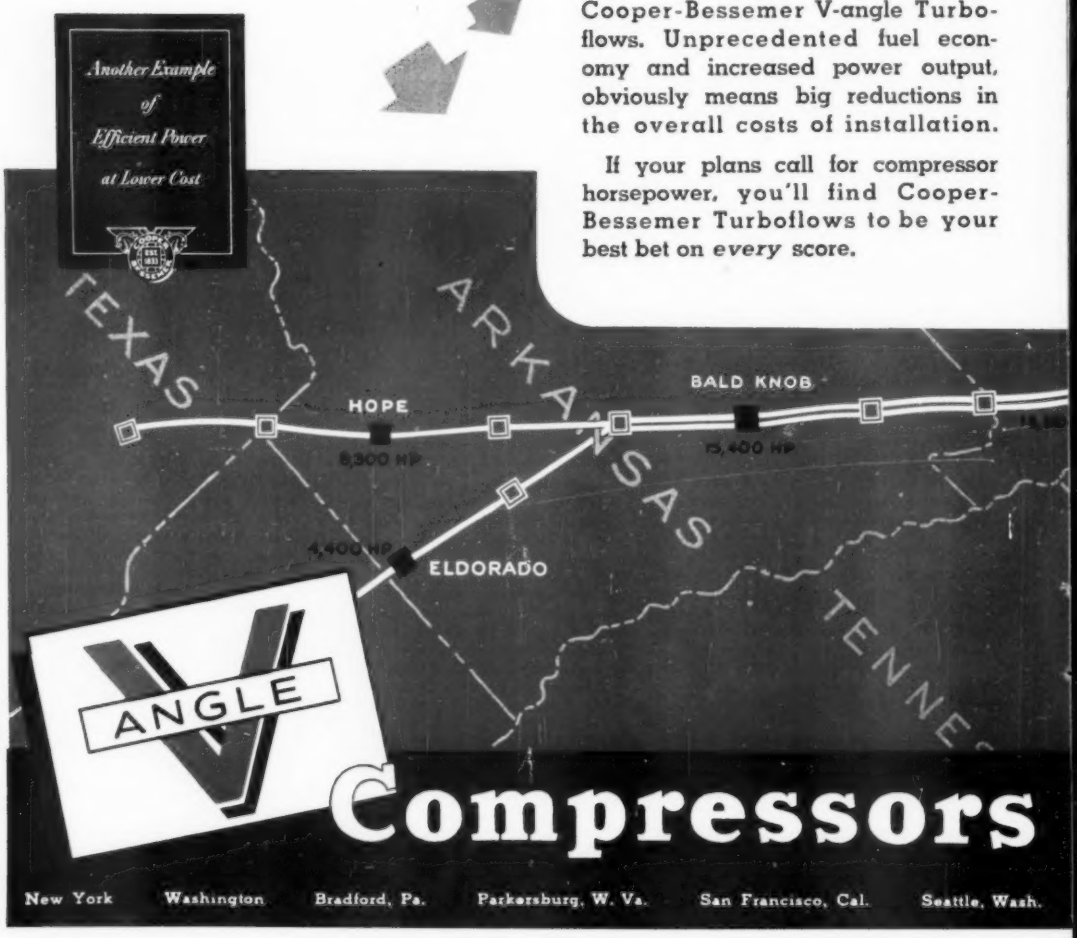

Compressors

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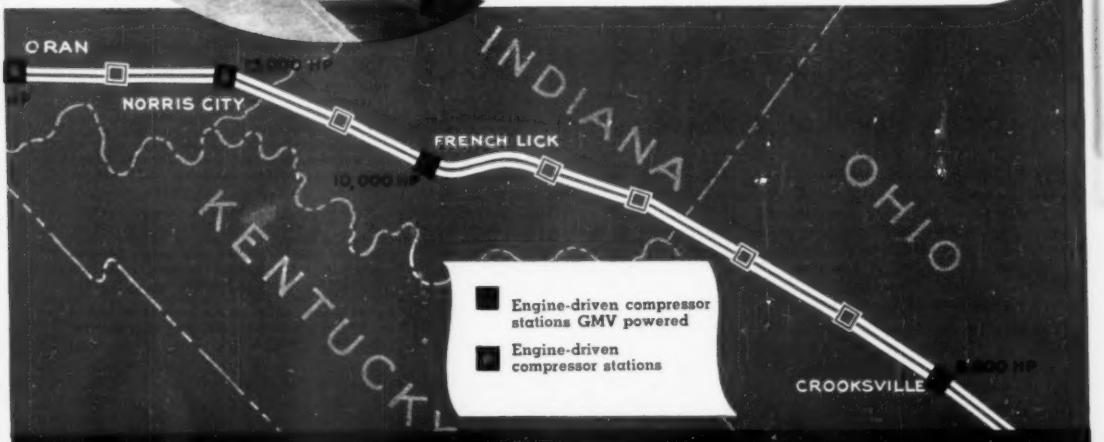
- Overhead view of 14 Cooper-Bessemer GMVs during installation at Texas Eastern's Bald Knob, Arkansas, station. Total: 15,400 hp.

- GMV 10-cylinder compressors in Texas Eastern Transmission Corporation's Hope, Arkansas, station . . . 8,300 efficient horsepower.



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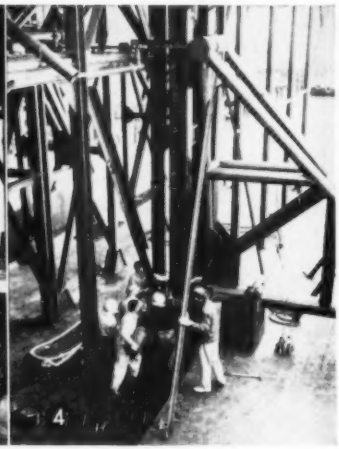


NEW SEA DRILL EFFICIENTLY MOVES AND DRILLS IN GULF

by John T. Hayward*

FIRST description of the new drilling barge built by Barnsdall Oil Co., Seaboard Oil Co., and Callery & Hurt (with Barnsdall as designer and operator) appeared in the trade press in the article published by The Oil and Gas Journal, December 2, 1948. At that time last phases of construction of the barge were taking place at Alexander Shipyards, Inc., New Orleans. Since then the new Barnsdall drilling barge has been completed and put into service in open gulf waters of 20-ft. depth. Approximate location of the drilling site is 6 miles north from Breton Light in Breton Sound, Louisiana.

This barge unit was drilling below

*Vice president, Barnsdall Research Corp., Tulsa.

1—PREPARATION FOR TOWING.—The structure as shown here is nearly ready for the move down the intercoastal canal to the final assembly point. The barge hull is 160 ft. long, 54 ft. wide, and 13 ft. deep. Except for attaching the pontoons and completing the derrick, final construction was done in the Alexander yards. The pontoons were lashed together and towed separately to the assembly point at Gulfport.

2—EN ROUTE THROUGH THE INTERCOASTAL CANAL.—The barge is shown here navigating one of the bridges which cross the intercoastal canal. The trip was made during the latter part of January this year. Pontoons were left off the structure so that it would pass through the canal in which it had to travel; the derrick was only partially erected so as to pass under the high-voltage electric lines visible in the photo.

3—MANEUVERING THE BARGE.—The long slot shown here provides access through the barge to the ocean floor for the drilling tools and casing. During the trip from New Orleans, with winds blowing from 20 to 25 m.p.h., no towing trouble was encountered. When in place at the well location, the barge and pontoons are completely submerged; wave action therefore affects only the relatively small area of the substructure. Submergence also minimizes the effect of change in water level—in other words, with the hull being under water, changes in water level have negligible effect on the buoyancy.

4—FINAL FITTING-OUT.—Outrigger pontoons were attached to the drilling structure at Gulfport, Miss., after the 70-mile trip from New Orleans. A crew is installing one of the pin rollers that holds the pontoon to the barge unit. The rollers move in vertical guides as the drilling structure sinks. Pontoons are forced into the ocean floor to prevent scouring and help hold the barge in position. Each of the pontoons is 100 ft. long, 14 ft. wide, and 12 ft. deep.

5—TOWING TO LOCATION.—Upon completion of the last assembly work in Gulfport yards, the barge was towed to its first location. The derrick shown as a stub here was completed later. There are two decks on the superstructure, the lower one being occupied by the drilling machinery and its power plant, while on the other deck there are the derrick floor, the draw works, and the living quarters.

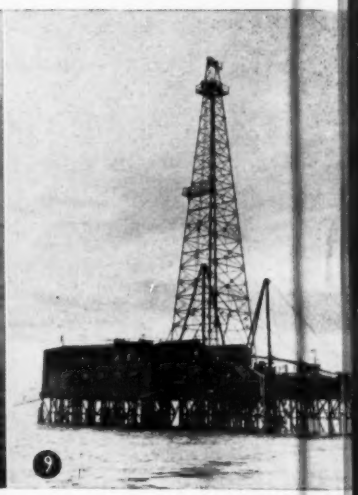
15 V 16 400+50-Toc

6—FLOODING HULL TANKS.—Once at the location, the main portion of the barge is flooded. Stability for the structure is maintained by the outriggers, the end of one showing behind the vertical substructure members. When the deck of the main barge is awash, as it nearly is here, all stability derived from it is lost, and the outriggers must support the unit.

7—ACCESS TO TRANSFER PUMPS.—Transfer pumps for ballast fuel and water are located in the hull. Access to this compartment is through a "trunk" which also contains the piping and electrical wiring. Altogether there are more than 30 pipe systems in this "trunk."

8—DERRICK COMPLETED AFTER POSITIONING.—Thorough studies were conducted on the effect of waves and current scouring action on a scale model in a test tank. To measure their actual effect in the open water, a Navy L.S.M. was stripped to the hull, towed to the approximate location of the contemplated well, and sunk to the ocean floor. Close checks were kept on the position of the submerged vessel, shown in the foreground of the photograph, and this information advantageously used in operation of the drilling barge.

9—IN POSITION TO DRILL.—When finally in position, ready to drill its first well, the barge and pontoons are submerged, giving the structure much the same appearance as the conventional permanent platforms built on pilings in other parts of the gulf. This entire installation, however, may be raised and moved to a new location within a relatively short time, effecting enormous savings in construction costs.



10,500 ft. early this month and no trouble whatsoever has been experienced with it. In spite of storms with wind velocities exceeding 55 m.p.h., the whole platform has been maintained within 0.1° of vertical and there has been no lateral movement whatsoever. It has been possible to limit the sinking of the barge into the soft gulf bottom to less than 3 in. by adjusting the ballast so as to spread the load evenly and to carry a large portion of it by buoyancy rather than by pressure on the bottom.

No difficulty was experienced during the sinking; and the barge, having been initially set down 80 ft. from the proper location, was refloated and moved the 80 ft., all within a couple of hours.

Moving From New Orleans to First Location in Gulf

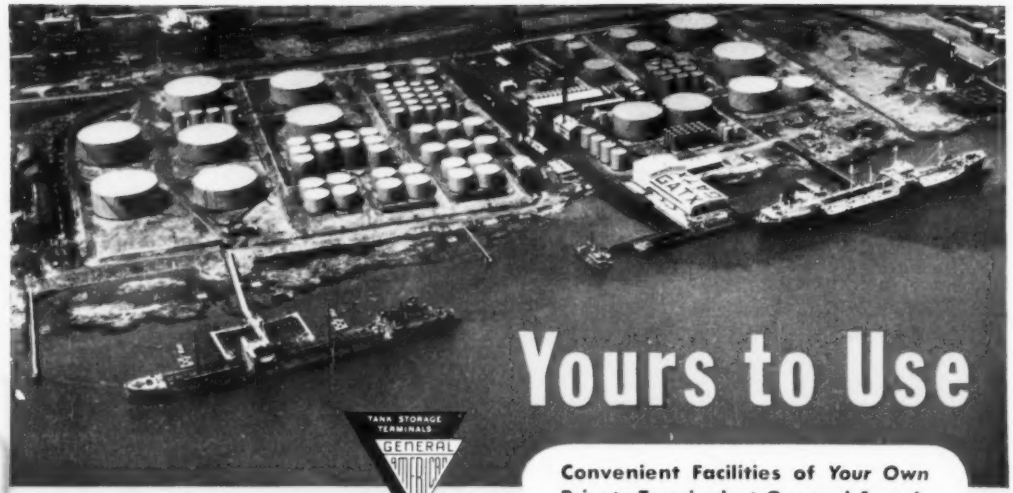
The photographs accompanying this article provide an interesting account of Barnsdall's so-called "stabilized sea drill" from construction point at the New Orleans shipyards, on through to its present drilling site in the Gulf of Mexico.

At the shipyards the drilling barge was fitted with all superstructure and drilling equipment except the derrick. The derrick and outrigger pontoons were added later because, with them installed, the vessel could not pass through the intercoastal canal and under bridges on its way to the Gulf of Mexico. The pontoons were added at Gulfport, Miss., before towing to location, and the derrick was erected at the location in the gulf.

The drilling barge houses living quarters for the crew, drilling and auxiliary equipment, dry and active mud storage, and equipment and commissary storage (see details in the previous article in The Oil and Gas Journal). After the unit was towed to the well location, the barge hull was flooded and caused to sink to the ocean floor. Stability during the flooding operations in this design is afforded by two large pontoons attached outrigger fashion to the main structure by the cantilever jack mechanism. The pontoons are lowered to the bottom and forced into the ocean floor after the main barge has reached its position on bottom.

Savings Possible by Barge Design

Very substantial savings are in sight by the use of this type of offshore drilling unit. Both hull and superstructure cost less than a pile foundation would have cost in the same area. The drilling equipment and quarters are similar to those constructed on pile foundations, except that in this barge device they are installed permanently in the shipyard and not under the great difficulties encountered when such an installation is made on a pile foundation in exposed waters. Unloading derrick material, draw works, heavy machinery, and other equipment onto a plat-



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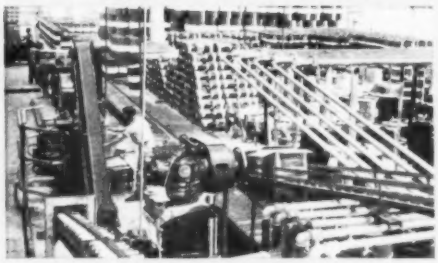

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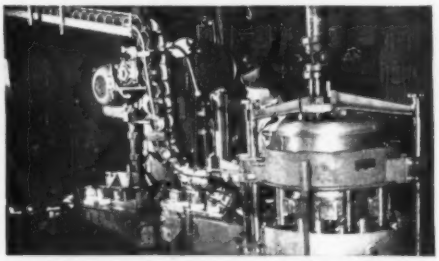

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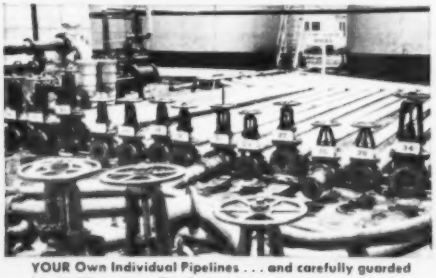

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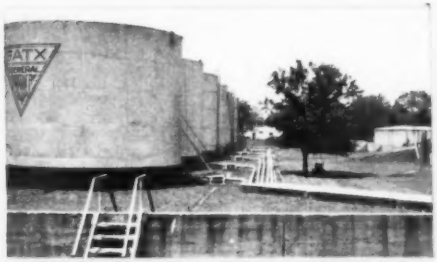

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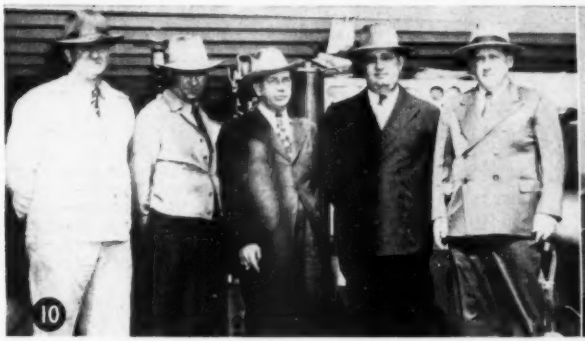

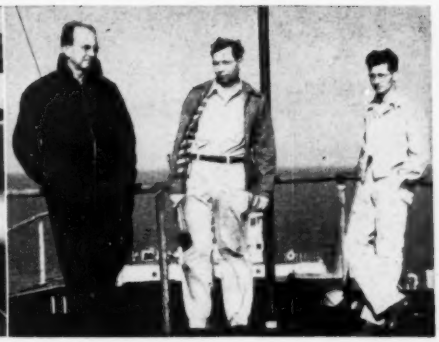

10—INSPECTION TOUR.—Construction of this new kind of drilling unit aroused much interest. Among those men from the Barnsdall organization who visited the barge upon its completion were Pete Poteet, tool pusher; H. D. "Rags" Jones, district production superintendent (New Orleans); George Nolan, former manager of drilling department and now independent drilling contractor; H. W. Manley, vice president and manager of production department; and D. R. Snow, vice president and general manager (all at Tulsa).

11—SUCCESSFUL VENTURE.—Shown after successfully submerging the barge into drilling position are John Hayward, inventor and designer of the barge and vice president of Barnsdall Research Corp.; G. E. McClatchey, resident engineer on barge during construction and now engineer in charge on the barge; and Bill Brock, assistant barge engineer.

form in exposed waters of the gulf is a most difficult operation.

All that is needed to get the whole outfit to a location in the gulf is to pump out the compartments and attach a tow line to a tug. It can be towed safely at a rate of 5 miles an hour. When at the new location, simply fill the compartments with water as ballast and let the barge sink. It then is ready to start drilling operations.

During its trip to its first location in Breton Sound, the outfit made a trip 70 miles in open water and during this trip there was a wind of from 20 to 25 m.p.h.

In conclusion, it is believed that with this type of drilling platform wells can be drilled in 30 ft. of water of the Gulf of Mexico nearly as cheaply as we can drill on land. Moving derrick, machinery, and all other equipment from a location in the gulf to another location is cheaper, with this drilling platform on a barge setup, than moving on land.

With this outfit it is not necessary to tear down derrick, machinery, and other equipment. A lot of trucks are not needed. Nor is it necessary to build or condition roads. Derrick and equipment need not be assembled at the new location. This outfit can be moved from one location to another, even 50 miles away, and be ready to start drilling within 24 hours after finishing work at one location.

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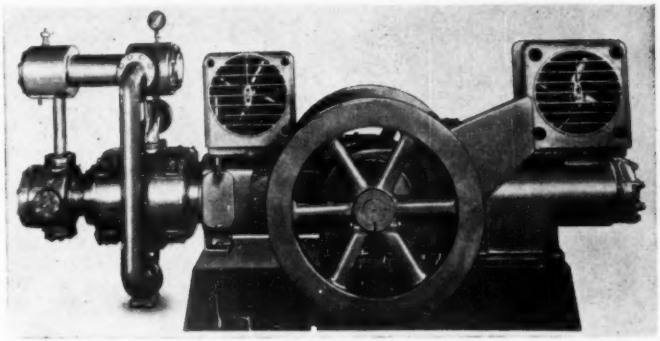

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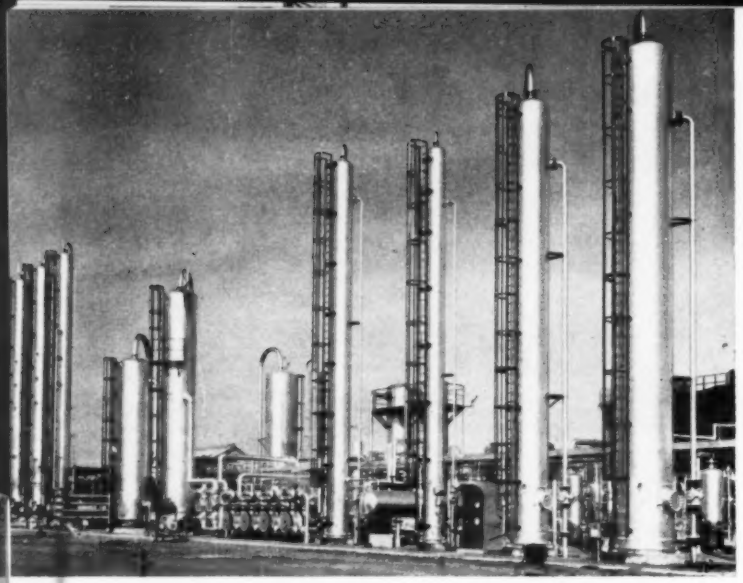


Main processing section of the Silsbee plant, operated by American Republics Corp. The plant operates on casing-head gas at three different pressure levels and delivers cycle, sales, and lift gas to three systems

Silsbee Gas-Processing Plant Performs Wide Variety of Functions

by W. T. Bryant*

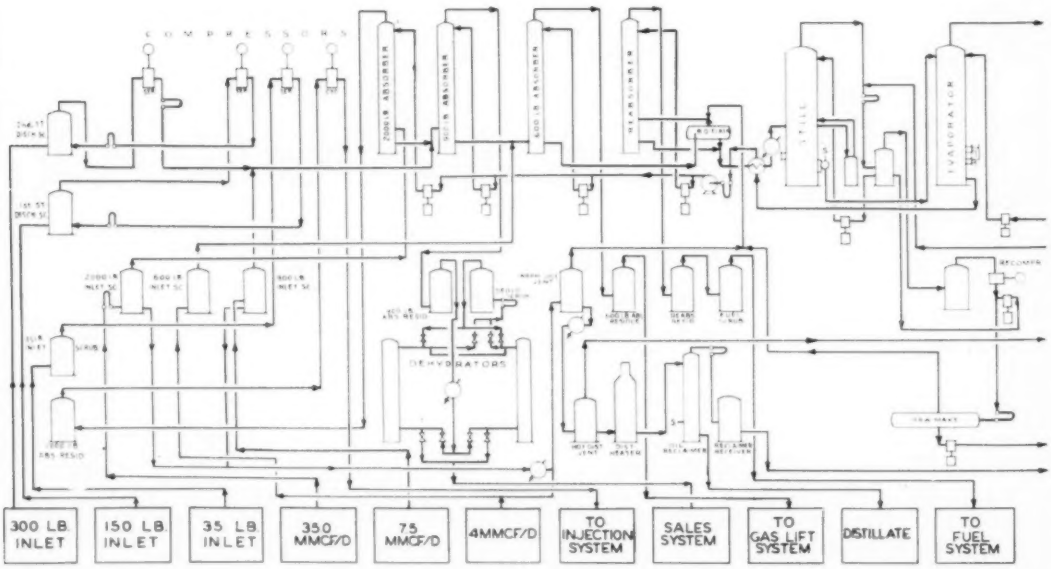
A MULTIPLICITY of functions is an outstanding feature of a recently completed gas-processing plant in Silsbee field of Hardin County, Texas, 30 miles north of Beaumont. In utilizing 100 per cent of the field's gas, the plant (1) furnishes 4,000-psi. recycling gas, (2) strips the gas used for gas lift, (3) manufactures propane, butane, leaded motor fuel, unleaded motor fuel, kerosine, mineral seal oil, and L.P.G., (4) compresses and strips for sales the separator gas, and (5) provides additional high-pressure makeup gas for sales. Plant is so designed as to utilize 100 per cent of the flare gas in Silsbee field and also cycle a number of distillate sands.

American Republics Corp. built and is operating the plant for a unit consisting of American Republics Corp., General Crude Oil Co., Humble Oil & Refining Co., and Houston Oil Co. of Texas. Silsbee field produces from the Yegua sand at depths ranging from 6,800 to 6,960 ft. It was discovered by Republic Production Co. 1 F. P. Elliott League, fee, in 1936.

Gas enters the plant under six different conditions at pressures and in quantities as follows:

Casing-head gas, 6,000 M.c.f. daily at 35 psi., 3,000 M.c.f. daily at 150 psi., and 3,000 M.c.f. daily at 300 psi.; **cycle gas,** 35,000 M.c.f. daily at 2,000

*General superintendent, gas-gasoline department, American Republics Corp., Houston.



psi. maximum inlet pressure (this figure may be higher depending on what ultimate injection pressure is necessary); **sales gas makeup,** 15,000-20,000 M.c.f. daily at 900 psi. inlet pressure (source of this gas is stringer sand wells in the vicinity, and the amount produced is varied to fit the requirements of the transmission company taking the field's gas); and **gas-lift gas,** 4,000-5,000 M.c.f. daily at 600 psi. inlet (from nearby gas-lift compressor station).

The plant is designed to produce approximately 125,000 gal. per day of products. These are broken down as follows: 30,000 gal. of butane (95 per cent plus purity), 30,000 gal. of propane (95 per cent plus purity), 60,000 gal. of motor fuel, and 5,000 gal. of kerosine and absorption oil. Recovery percentages are: propane, 65 per cent in tanks, butane, 98 per cent, and heavier products, approximately 100 per cent.

Absorption Equipment Details

In selecting absorber equipment, the 2,000-psi. absorber was chosen because of the gas-cycling operation to be carried on. An economical balance, between absorption efficiency and horsepower required for compressing injection gas, was made. Choice of a 900-psi. absorber was based on the fact that this was the pressure of the transmission line taking the plant's dry gas. The 600-psi. absorber was predicated on the fact that it was desired to deliver gas to the gas lift system at this pressure.

The rich oil from the base of the 2,000-psi. absorber is flashed in the base of the 900-psi. absorber. Similarly, the rich oil from the 900-psi. absorber is flashed in the base of the 600-psi. absorber. Gas from the field enters the 900 and 600-psi. absorbers along with the rich oil from the previous absorber.

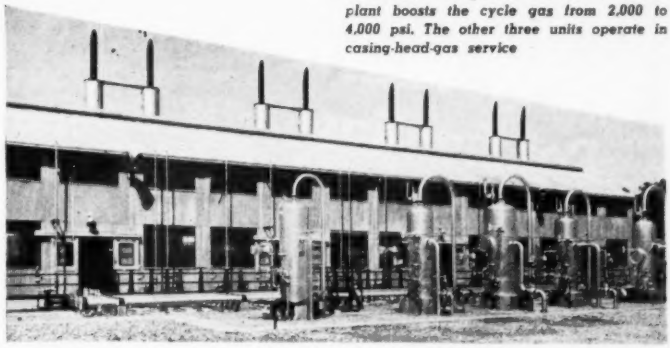
Rich oil from the 600-psi. absorber is flashed in a 250-psi. rich-oil flash tank. Vapors from the rich-oil flash tank, vapors from the cold distillate flash tank, and the vapors from the raw make tank all go to the absorber. Plant fuel is furnished from vent of the reabsorber. Any makeup fuel that is required is supplied by residue gas from the 900-psi. absorber. Rich oil from the rich-oil flash tank passes through the oil exchangers where it takes up heat from the lean oil from the evaporator base. After leaving the oil exchangers, the rich oil passes through a steam preheater and enters the high-pressure still.

The construction of the 2,000-psi. absorber is unusual in that the shell for it was manufactured in one solid forging. It is 46 ft., seam to seam, 60 in. i.d., and has 3⅞-in. walls and 3 21/32-in. heads.

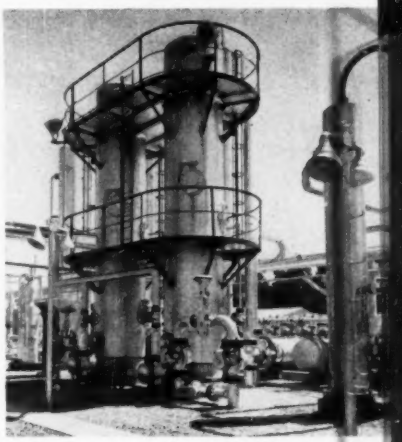
Lean oil for the 900 and 2,000-psi. absorbers is furnished by three Worthington horizontal duplex power pumps driven by type PVG-4 Ingersoll-Rand gas engines, rated at 185 hp. Under normal operations, one pump furnishes 200 g.p.m. of oil to the 900-psi. absorber and the other two pumps furnish approximately 130 g.p.m. each to the 2,000-psi. absorber. The pumps are so piped that one of the 2,000-psi. oil pumps is a standby for the other two pumps. In the event of one pump being out of service, it is possible to furnish 150 g.p.m. each to the 2,000 and 900-psi. absorber.

Compression Service Reaches 4,000 Psi.

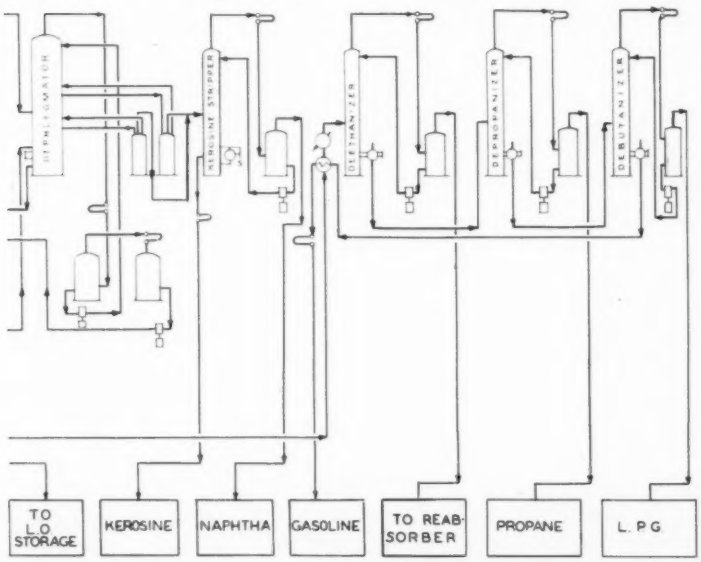
The Silsbee plant's main compres-



One of the 4 compressor units at the Silsbee plant boosts the cycle gas from 2,000 to 4,000 psi. The other three units operate in casing-head-gas service



The dehydrators through which the overhead gas from the 900-psi. absorber is processed as sales gas



Schematic flow arrangement of the American Republics Corp.-operated Silsbee plant

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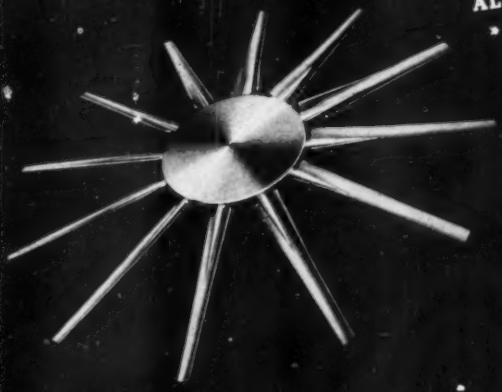

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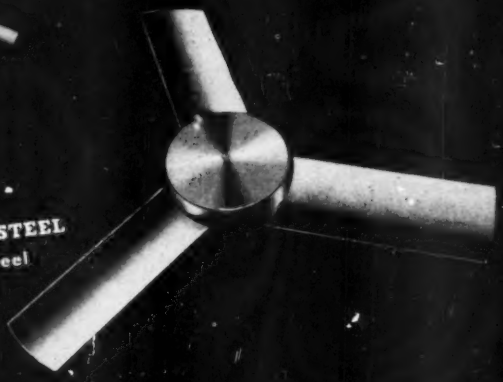
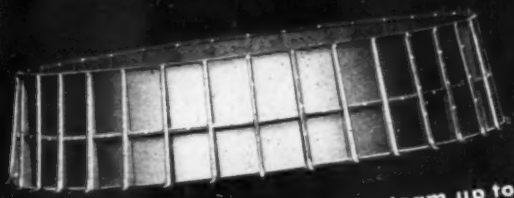
- High tensile cast aluminum alloy
- Adjustable pitch
- Air foil section
- Twisted and tapered blades



STAINLESS STEEL
- All stainless steel
- Adjustable pitch
- Balanced
- Air foil section
- Quiet and smooth operation



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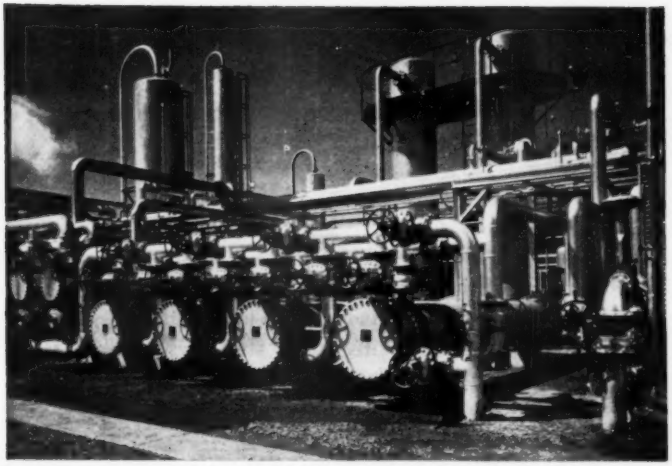


This view of the plant's operating section shows a portion of the heat-transfer equipment and the manifold system

sors consist of four 800-hp. two-cycle, right-angle, four-cylinder compressors. One compressor has the sole job of boosting cycle gas from 2,000 to 4,000 psi. In addition, one cylinder of two other compressors is used for the same purpose. Three of the compressors have one cylinder each for boosting gas from 35 to 150 psi., from 150 to 300 psi., and from 300 to 900 psi. One of the four has a cylinder in use for recompressor service (boosting from 150 to 300 psi.).

With so many services required from the compressors an interesting and difficult loading problem was presented.

Dehydration Unit

Gas from the 900-psi. absorber residue scrubber goes to a dehydration unit. This unit consists of two dehydrators operating at 900 psi. One is regenerated while the other is in operation. Regeneration is accomplished by drawing off a side stream of gas ahead of the operating dehydrator and passing it through a steam heater into the dehydrator being regenerated. The regeneration gas then passes through a cooler into a residue scrubber and back to the operating dehydrator.

In order to introduce the regeneration gas into the operating dehydrator, an orifice fitting is placed in the line upstream from the point of introduction. The size of the orifice in this fitting is such that the pressure drop induced is equal to the pressure drop through the regeneration system when 10 per cent of the main flow is used for regeneration. This provides a relatively inexpensive means of automatically proportioning the flow without the danger of interrupting the main flow because of instrument failure.

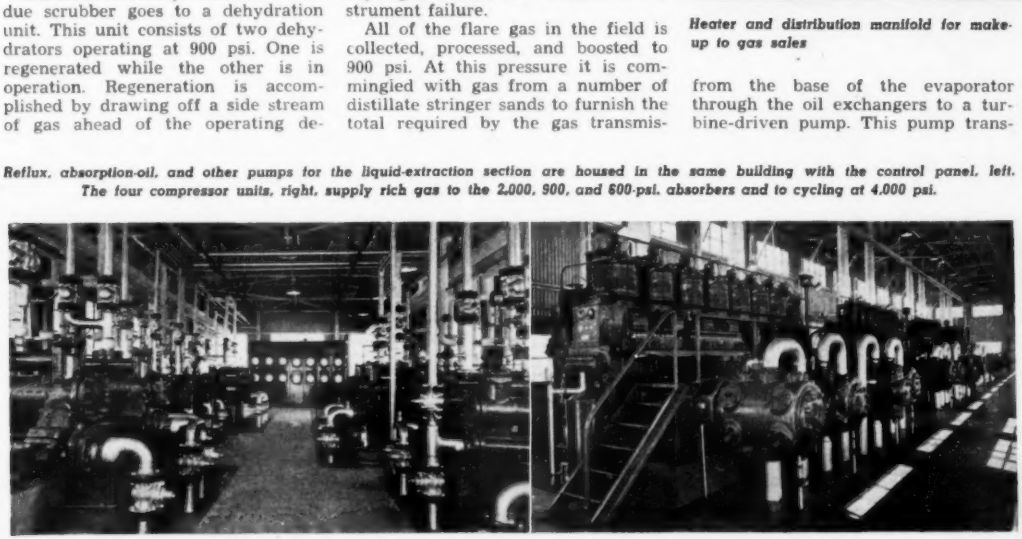
All of the flare gas in the field is collected, processed, and boosted to 900 psi. At this pressure it is commingled with gas from a number of distillate stringer sands to furnish the total required by the gas transmission company. The gas is delivered through a 16-mile, 10-in. line to Texas Eastern Transmission Co.'s main line.

High-Pressure Still and Dephlegmators

Rich oil from the rich-oil flash tank is piped to a high-pressure still operating at approximately 150 psi. and 400° F. on the base. Stripping steam removes from the feed enough of the lighter ends that the remaining components will be totally condensing when stripped in the evaporator dephlegmator at around 50 psi. Rich oil which has not been completely stripped in the high-pressure still is fed into the top tray of the evaporator column. Stripping steam passes through a steam superheater and into the evaporator where the absorbed components are stripped from the lean oil. The resulting lean oil passes from the base of the evaporator through the oil exchangers to a turbine-driven pump. This pump trans-

Heater and distribution manifold for make-up to gas sales

Reflux, absorption-oil, and other pumps for the liquid-extraction section are housed in the same building with the control panel, left. The four compressor units, right, supply rich gas to the 2,000, 900, and 600-psi. absorbers and to cycling at 4,000 psi.



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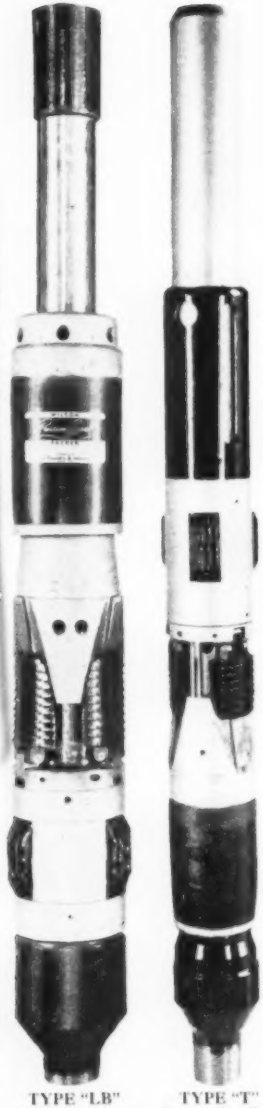

TYPE "LB" (Patent Pending)

TYPE "T" (Patent Pending)

In the belief that no "one Packer" can successfully meet all the varying conditions of the Oil Producing Industry—the Wilson Foundry & Machine Company has developed two "Special" Hook-Wall Packers to go with their standard type "LB" Packer. These two New Packers are the type "MB", "Metal Block" Packer, and the type "T" "Upside Down" Packer.

The WILSON Type "LB" "Positive Seal" Hook-Wall Packer *—fool proof in setting*

This packer assures a "Positive Seal" regardless of where the differential occurs, above the element or below the element. If the differential is above, the rubber element is pressed against the seat, assuring a tight seal-off. If the differential is below, the patented split pack-off of the rubber element gives a "Lip-Seal"—the greater the pressure the tighter the seal.

In the Wilson "Positive Seal" Hook-Wall Packer, three friction blocks, hard faced with stellite are used in place of friction wiper springs. These friction blocks are held against the wall of casing by three rugged coil springs—and insure correct setting regardless of depth.

The non-vulcanizing pack-off element is expanded by conical wedge—and does not depend on excessive tubing weight on packer to secure pack-off.

Slips and slip reins are compact. Slips are set in "dove-tail" on mandrel and cannot be lost in the hole.

There is ample "by-pass" area for fluid between the tube and pack-off. When packer is set—"by-pass" is closed by pack-off sealing tube and casing. Foreign matter in fluid will not interfere with closing of "by-pass."

*This packer can be set in "mixed" strings of casing, a feature that means small inventories.

**Special Packer required on some types of Internal Upset Casing.*

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PACKER Especially Designed Condition Encountered

The WILSON Type "MB" "Metal Block" Hook-Wall Packer
—for real Deep wells

No matter how deep you are—how great your hydrostatic head is—when you set the *new* Wilson "Metal Block," type "MB" Packer—it *holds*.

This new "Metal Block" Packer is especially designed for DEEP PRODUCTION—where the hydrostatic head is greater than the bottom hole pressure. It is especially designed to prevent all cold flow of rubber between the casing and the outside diameter of the tool.

This is accomplished with six overlapping steel segments that come directly in contact with the casing right below the rubber element. This "Metal Block" of segments totally confines the rubber element between the casing, the top of the "Metal Block" and the mandrel of the Packer.

In going-in and coming-out of the hole, the "Metal Block" is retracted to the same diameter of the packer. In setting the Packer, the segments expand against the casing at the same time as the slips are set.

The WILSON Type "T" "Upside Down" Hook-Wall Packer
—sets by pulling up on Tubing

For testing casing leaks; for acidizing; for high pressure gas wells, where the bottom hole pressure is greater than the hydrostatic head—the Wilson "Upside Down" Packer has no equal.

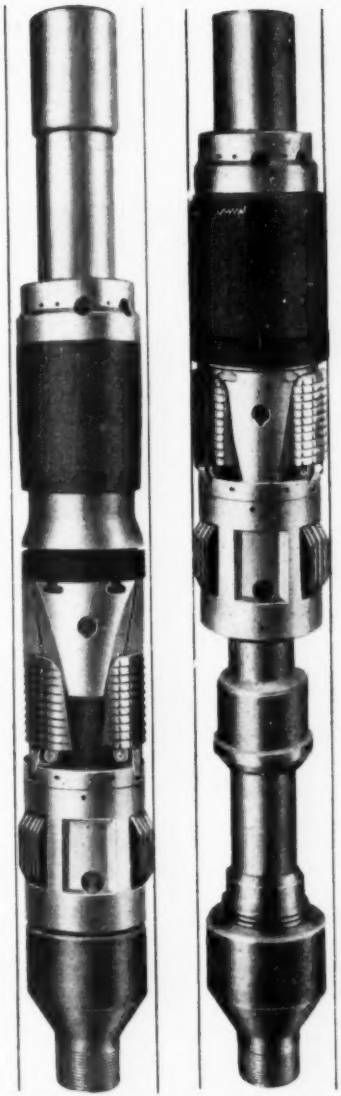
With this new Packer you can stop the "breathing" of your tubing while the pump is in motion, thus increasing the pumping capacity of your well.

Kinks in the tubing are eliminated, thus minimizing wear on rods and tubing.

This Wilson, Type "T" "Upside Down" Packer can be furnished without the rubber element, when it is desired only to anchor your tubing.

Packer is released with downward stroke, instead of an upward jerk, with a torque to the right. The downward motion automatically jars the packer loose.

At Your Supply Store



TYPE "MB" GOING IN HOLE — TYPE "MB" SET

(Patent Pending)

& MACHINE CO.

TEXAS

fers the lean oil through the oil coolers, into the reabsorber, and to the suction of the absorber lean oil pumps.

The overhead from the evaporator column passes into the base of the feed of the evaporator. The overhead from the dephlegmator passes through primary condensers into the dephlegmator reflux receiver. Liquid from the dephlegmator reflux receiver passes through the final condenser, where subcooling occurs, into the dephlegmator receiver which is totally condensing. Liquid from the dephlegmator receiver is pumped into the overhead from the high-pressure still, ahead of the still condenser. Vapors and liquid from the still condenser are separated in the still reflux receiver. Vapors go to the recompressor cylinder and thence to the recompressor condenser. Liquid from the still reflux receiver is pumped into the discharge of the recompressor ahead of the recompressor condenser. Resulting liquid and vapor go to the raw make tank. It should be noted that the use of the still condenser and the recompressor condenser approach one-tray absorption action.

Going back to the dephlegmator, two drawoff trays are incorporated in it. Part of the stripping stream is drawn off as water from each of the drawoff trays by means of a liquid level controller on the small pot. With the water coming off from the lower drawoff tray, is a mixture of naphtha and kerosine. This mixture is drawn off from the pot and sent to the kerosine side stripper, where the naphtha is taken overhead and the kerosine from the base to storage. A naphtha cut is also taken off the top drawoff tray, in addition to steam condensate. Under normal operation the naphtha from both the upper tray and the side stripper overhead are blended with the gasoline in the line to storage to make a specification motor fuel.

This two-still arrangement results in a higher suction pressure to the recompressor than the conventional one-still arrangement, and as a result, the amount of recompressor horsepower required is less. Also, the amount of total stripping steam is kept at a minimum.

The liquid from the raw make tank is pumped through conventional fractionating columns consisting of deethanizer, depropanizer, and debutanizer in this order. Vent gas from the deethanizer reflux receiver may be sent to the fuel scrubber or to the reabsorber. By sending this vapor to the reabsorber, propane in the gas may be substantially recovered in the absorber.

Cooling Tower

A Lillie-Hoffman Cooling Tower, Inc., induced-draft, cooling tower erected on a coil shed, with an additional coil shed at a separate location, is used for the plant. Tower capacity is approximately 4,000 g.p.m. The tower consists of five cells with a 20-hp. induced-draft fan for each step. In the separate coil shed, which is 75 ft. away from the cooling tower, is mounted the interstage coolers for the compressors and the jacket-water coolers for the engines.

Water is sprayed over the jacket-water coils by means of a recirculation pump mounted at the cooling tower. This recirculation pump also passes water over the hottest coils in the main cooling tower coil shed. Cold water is passed over the interstage coolers by means of a cold-water pump located at the cooling tower. On the incoming 2,000-psi. inlet gas line is an atmospheric section located in the cooling-tower coil shed. Either cold or warm water may be pumped over it by the recirculation pump. This permits operation just above the hydrate point, regardless of atmospheric or well-head temperatures.

Boilers

The steam-generating plant consists of six 150-b.hp. oil-field-type boilers operating at 300 psi. Makeup water

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to the boilers is kept to a minimum by returning to the boiler-feed tank all of the condensate from the steam heaters and condensed stripping steam taken off by drawoff trays and condensed into reflux receivers.

The condensate return system consists of two separate parts. Exhaust steam which is condensed goes to the low-pressure, condensate system. The condensate, in this system, is pumped to the boiler feed tank. High-pressure steam, which is condensed, goes directly to a small drum where the pressure is reduced to the pressure of exhaust steam. This results in the condensate flashing and forming additional exhaust steam needed for process steam. Condensate which does not flash is pressured to the boiler feed tank. The boiler feedwater pump takes suction from the boiler feed tank which is at atmospheric pressure. Condensate to the boiler feed tank is deaerated by means of a small deaerating column set on top of the feed tank.

Exhaust steam is used in all of the fractionator reboilers and for stripping in the evaporator. A sufficient number of the plant pumps are driven by steam so that during normal operation only a small amount of high-pressure steam makeup is required for these services.

Distillate System

Due to the composition and amount of dropout in the 2,000-psi. inlet scrubber, a separate distillate system was necessary. This distillate passes from the 2,000 to the 600-psi. inlet scrubber where it is flashed into the gas-lift-system absorber. It then passes through a steam preheater into a distillate flash tank operating at 200° F. Vapors from the distillate flash tank go to the reabsorber, as previously mentioned. The remaining liquid from this tank is heated to approximately 400° F. by means of another steam preheater and passes into the hot-distillate flash tank.

The resulting vapors from the hot distillate flash tank enter the dephlegmator. Liquid from the hot distillate flash tank passes through a direct-fired furnace and into an oil reclaimer. Prior to entering the furnace, a side stream of lean oil is added for the purpose of cleaning up the absorption oil. Overhead from the oil reclaimer passes through a cooler to lean oil storage.

Leading Plant

Approximately 5 miles from the plant, at the nearest railroad, is the leading plant where tetraethyl lead is added to the gasoline. Tetraethyl lead from a weighed storage tank is added to a pumped stream of gasoline and passed into one of two 5,000-bbl. tanks. Complete mixing of the concentrated leaded gasoline with the unleaded plant gasoline is accomplished by in-tank, motor-driven mixers.

A pump is provided to ship the leaded gasoline to the 30-car loading rack located directly across the road. Unleaded gasoline from the plant is transferred to the 5,000-bbl. tanks by means of vertical, motor-driven shipping pumps.

Generating System

Plant lighting and power are generated by two gas engines driving 250-kw. generators. The engines are four-cycle, eight-cylinder, gas engines. Only one generator is operated at a time to meet plant requirements. In order to take one generator out of operation and put the other in operation, a switchboard is provided which will permit automatic synchronization.

The Silsbee plant was designed and constructed by Gasoline Plant Construction Corp. of Houston. Project engineers were John C. Breaker and John F. Monday. Plant superintendent for American Republics is Ralph Duhr.

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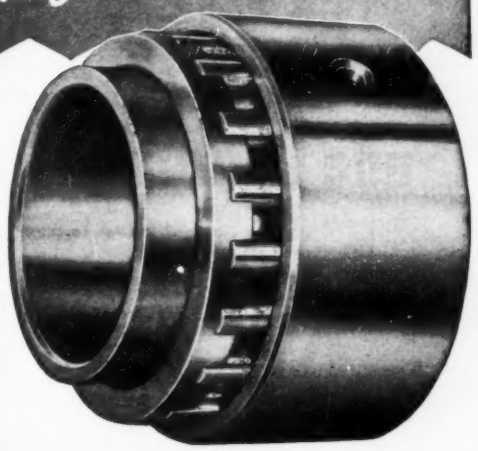

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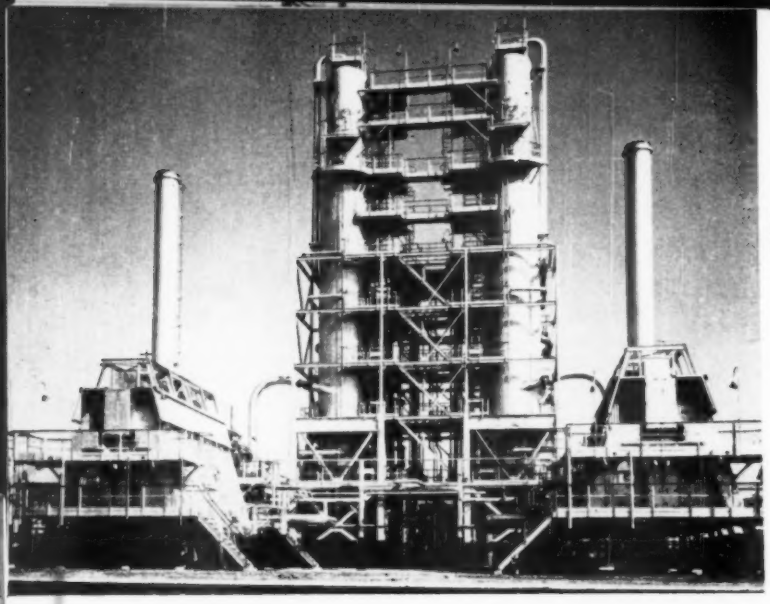

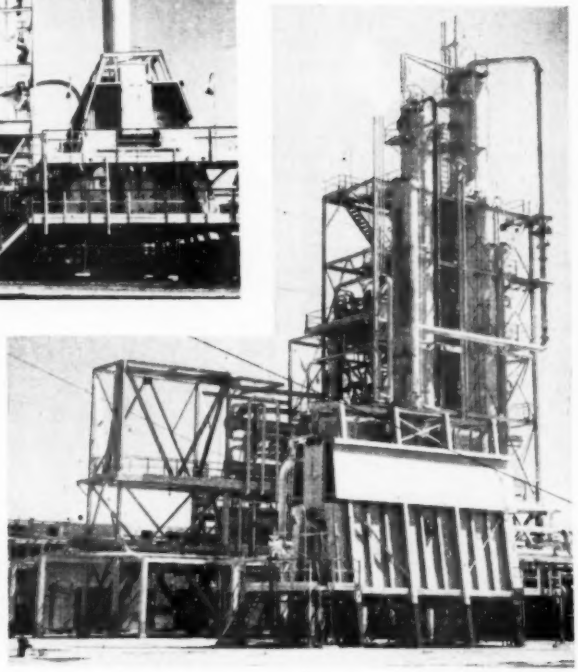

Two views of the new distillation equipment in Magnolia Petroleum Company's refinery at Beaumont

Magnolia's New

Lube Plant Has Current Crude Charging Capacity of 150,000 Bbl.

by George Weber
Refining Editor

THE recent completion of a major expansion program at Beaumont, Tex., has provided Magnolia Petroleum Co. with one of the largest and most modern lubricating-oil plants in the nation. One of the largest refineries on the Gulf Coast, the Magnolia plant has a current crude charging capacity of 150,000 bbl. per day. As one of the earliest complete refineries, it has produced a wide range of lubricants and waxes for years.

The new construction program concerns all phases of lubricant manufacture: distillation, solvent extraction, filtering, blending, and finishing. Vacuum fractionation capacity has been augmented by construction of two distillation units incorporating the current improvements in that technique.

A two-stage atmospheric and vacuum crude-distillation unit was completed a year ago as the first major step in the expansion program. It was designed specifically to process grade A coastal-type crudes for the standard lubricating-oil fractions. Nominal charge to this unit averages 6,000 bbl. daily. Treating facilities have been installed for neutralization of relatively high naphthenic acid content of the coastal oil fractions.

Two identical vacuum stills comprise a new distillation unit capable of high vacuum reduction of 9,500 bbl. of heavy charge per day. This twin unit, completed last January, is designed to top reduced paraffinic Mid-Continent crudes to a heavy tar residuum. It successfully reduces a topped East Texas crude to a 12 A.P.I. gravity bottom fraction. Both the combination unit and the twin vacuum unit were designed and constructed by M. W. Kellogg Co.

New refining facilities to handle the increased production of raw lube stocks include additional units for furfural solvent refining and M.E.K. solvent dewaxing. The furfural unit, of conventional design, will refine an average of 3,300 bbl. daily of distillate stocks of varying origin. Coke and sludge formation from solvent oxidation are minimized by vacuum deaeration of feed stock. Further oxidation during process is precluded by blanketing the principal vessels in the unit with natural gas.

The last major unit to go on stream was a 4,100-bbl.-per-day M.E.K. solvent dewaxing plant, placed in initial

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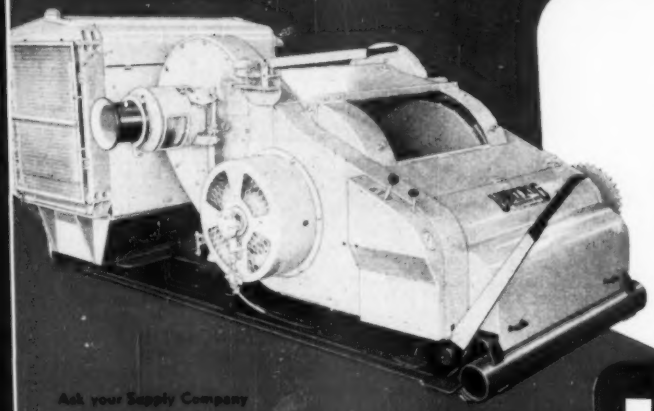

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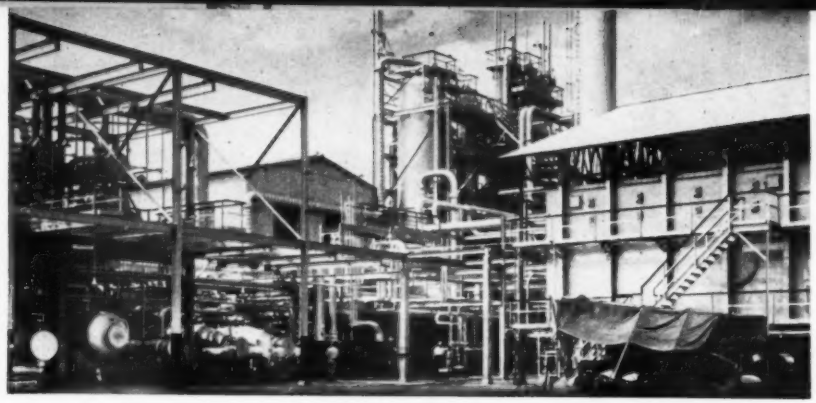


Left: The M.E.K. dewaxing plant in Magnolia's new lube-oil operations

Below: This new furfural refining unit at Beaumont is rated at 3,300 bbl. per day

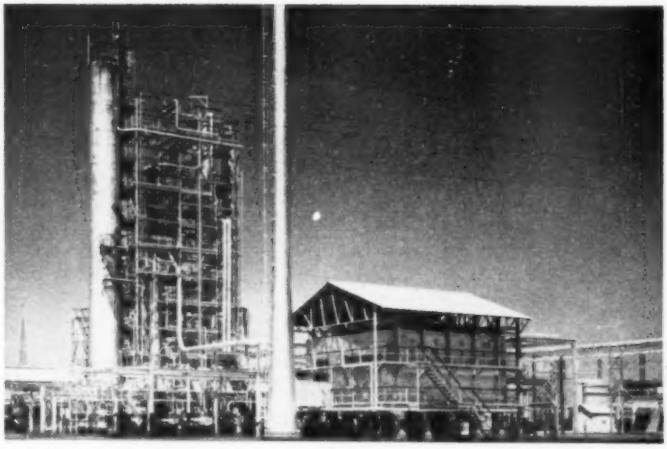
operation in early April. The new unit is designed specifically to handle the lighter distillate fractions. It will thus supplement the original M.E.K. unit which will convert to the handling of heavier gravity distillate and residual stocks. In addition to dewaxing, the new unit will be used for deoiling of slack wax in the manufacture of extremely low-oil-content waxes, a specialty line at Beaumont. The propane refrigerant in the new plant is handled by steam-turbine-driven centrifugal compressors. Both solvent units were constructed by Lummus Co.

Clay-treating facilities for decolorizing solvent refined oils and waxes have been enlarged by the addition of 12 pressure percolation vessels. The new expanded plant now includes 45 individual filter shells ranging in clay capacity from 12 to 40 tons. Thermofor clay regeneration capacity for fuller's earth and bauxite has been doubled by construction of a second 150-ton-per-day unit. This unit provides clay-regeneration capacity required for the percolation of the increased lubricating-oil and wax production and replaces a Wedge burner with the more efficient and flexible Thermofor kiln.

The blending plant as well as the barreling and packaging departments are being modified and modernized to cope with the new expanded operation.

The new plant additions largely duplicate existing facilities which included vacuum distillation, furfural, M.E.K., and Duo-Sol solvent units and filtration and other auxiliary units. In addition to the estimated 40 per cent expansion in capacity, the new units greatly increase the flexibility of the entire operation, and allow further specialization in the use of individual plant units, both new and old. In general, distillate fractions from the atmospheric and vacuum units will be furfural refined and the residual stocks will be refined by the Duo-Sol process. The M.E.K. units will serve a dual purpose for both dewaxing and deoiling.

Total production of all lubricating oils will average 4,950 bbl. daily. Virtually all of these oils are of standard premium grades. A small volume of commodity-type oils will continue



to be produced in decreasing volume. For these, some acid-treating facilities are still employed at a fraction of capacity.

Production of high grade waxes, for many years a Magnolia specialty, will be boosted measurably at Beaumont. Post expansion output will average 170,000 lb. of wax and 15,000 lb. of microcrystalline wax daily. Solvent deoiling techniques have been perfected by company engineers to produce an extremely low oil content product, principally used for paper coating. Slack wax from the M.E.K. units is first returned to the process for deoiling. Further oil extraction is accomplished by solvent naphtha pressing in plate and frame units, employing a narrow-boiling-range naphtha as the final deoiling solvent. Petrolatum from the Duo-Sol unit is similarly deoiled in the M.E.K. unit to produce microcrystalline waxes.

The grease plant is also undergoing modernization and some expansion with the addition of steam jacketed kettles and pressure cookers. The average output of 500,000 lb. per week includes in addition to the full line of standard company grades, the semifluid aluminum soap greases as well as the lesser line of industrial sodium base greases.

Pressure percolation is practiced in the clay treating plant for the flexibility and control it affords in the decolorizing of oils and waxes. For most operations, a 30-60 mesh Attapulgus fuller's earth is employed. Contrary to general practice, naphtha is not added to oil during filtration. After charging with fresh or regenerated clay, the filter shell is filled with oil under a static head, after which the shell is capped and pressure is allowed to build up to approximately 100 psi., varying with the grade of oil and the filtration rate desired. When the composite in the rundown compartment reaches prescribed color limit, oil is displaced from the filter shell with air purge and naphtha washing; steaming and clay dumping complete the conventional cycle. Fresh or new clay is segregated during the first four cycles. After the fifth regeneration, clays are mixed and stored as "equilibrium" clay, whose quality is controlled as required by continuous addition of fresh product.

Some bauxite is substituted for clay in the new plant to improve quality, primarily of waxes. Being more neutral, or less reactive, bauxite produces better odor and stability in waxes. Its decolorizing properties are of secondary importance.

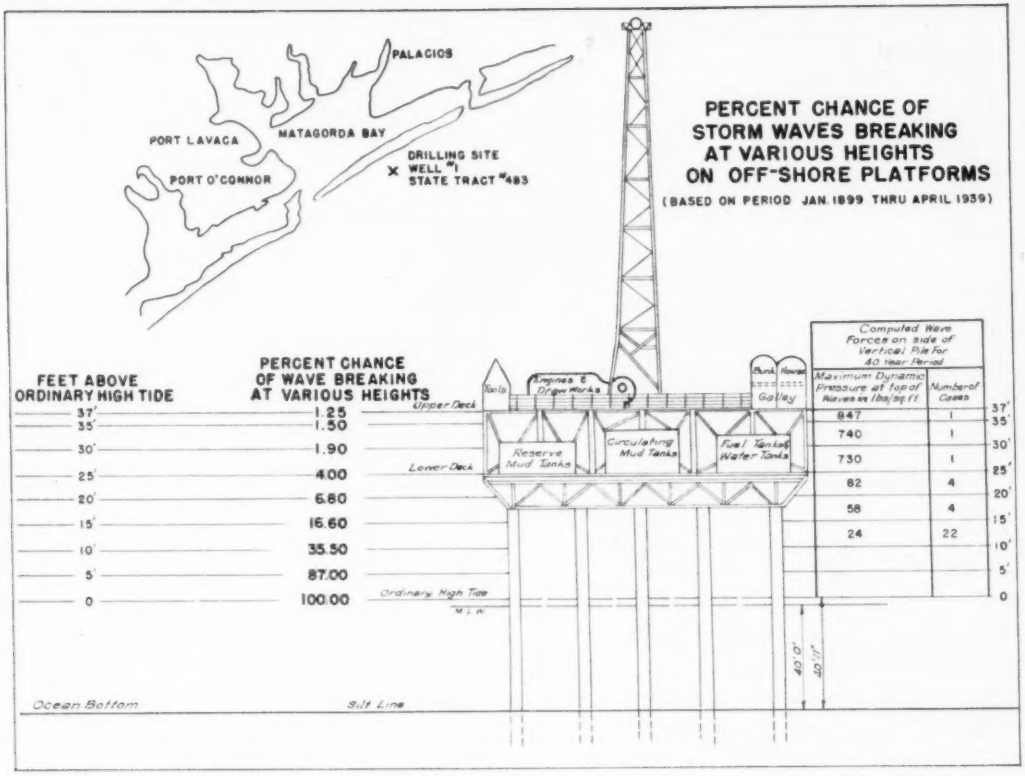


Fig. 1—Map of Gulf Coast offshore drilling site, cross-section of drilling platform, wave data and wave-height probabilities

Study of Oceanographic Factors for Texas Offshore Drilling Site

by Irving P. Krick

SINCE nearly all of the equipment used in offshore drilling operations is secured to or loaded on the platform located at the top of the superstructure piling, any damage to this platform is a serious matter. The height above mean water level at which this platform is built is the greatest single factor affecting the risk of loss due to wind or sea. A platform built too near the water surface will be battered by the breakers

*Prepared for Langham, Langston & Burnett, insurance brokers, Houston, by American Institute of Aerological Research, 1276 East Colorado Street, Pasadena, Calif.

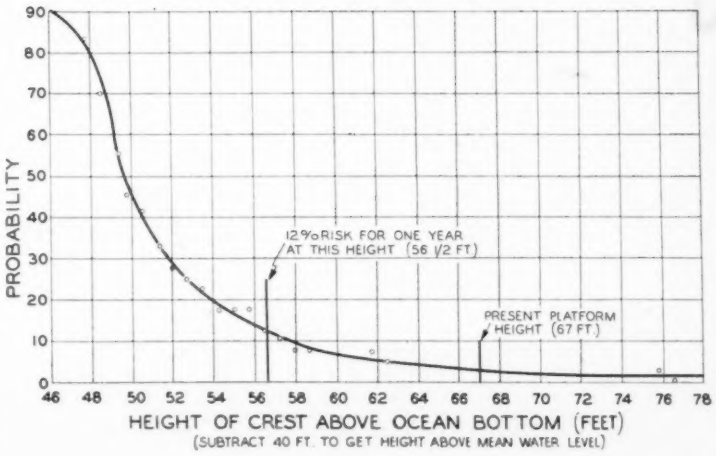


Fig. 2—Probability of wave crests attaining or exceeding various heights above the ocean bottom during any year (based on period January 1899 through December 1938)

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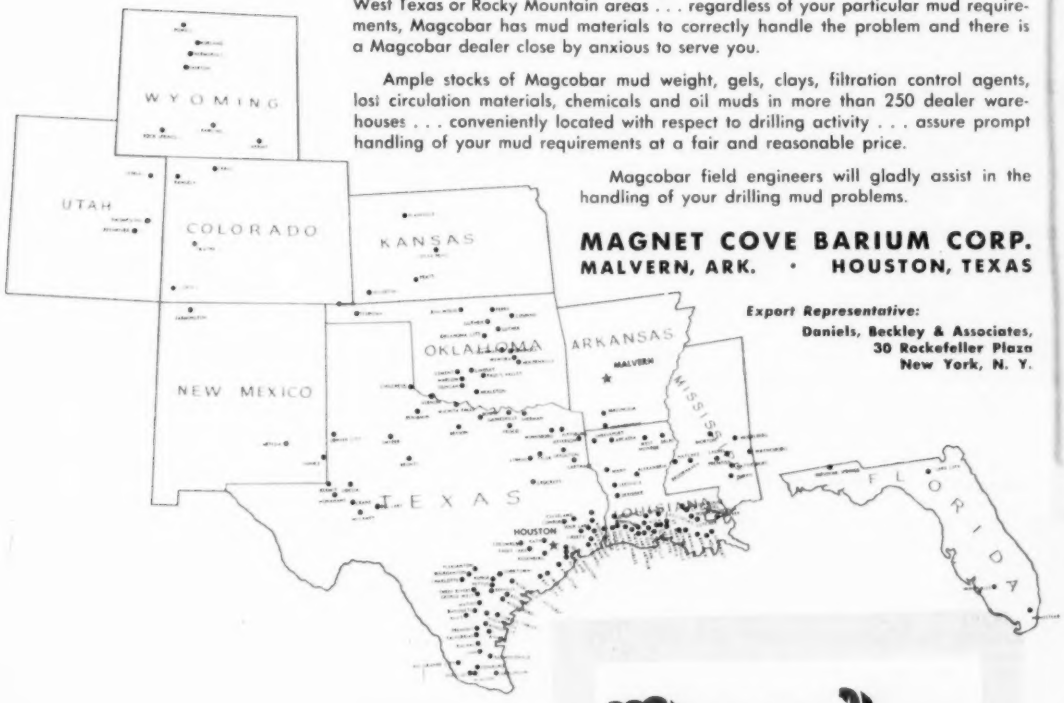

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of every severe tropical storm moving through the area. Under these conditions the platform and equipment thereon will be floated or washed away, causing partial, if not total loss. While it is unlikely that much damage would be caused to a completed producing well itself, the loss of platform and derrick equipment could run as high as $1,000,000 during one severe hurricane.

It is possible to place the platform unnecessarily high, thus involving excessive initial expense.

The best way to avoid either of these extremes is to have a complete analysis performed by competent experts, of the meteorological and oceanographic conditions to be expected at a particular site.

This survey has been made in order to provide the necessary data with which to calculate the risk of structural failure due to oceanographic influence at drilling installations of an oil company off Matagorda Peninsula, Texas Gulf Coast.

Location of Drilling Site

The normal depth of the water at the site, plus the contour pattern of the bottom and depth of water in the surrounding area, control the maximum height and other wave characteristics. Sometimes the maximum wave height is much less at a location only a few hundred feet away. The frequency of hurricanes differs considerably in different general areas and also, strong winds from "northers" are more severe in some regions than in others. Thus we are concerned with oceanographic and meteorological factors pertinent to the exact proposed drilling site.

Type of Structure Being Erected

The importance of design in the superstructure might be compared with the designing problems of the aircraft industry. In the case of drilling platforms, the variable forces of wind and waves move past a fixed structure whereas the airplane moves through the variable forces of wind and weather.

In both cases the design which offers the least resistance to opposing forces is the best design. Each structure should be classified individually on its merits and demerits of design. Round piling will offer less resistance to breakers than square ones. Crossbracing between piling should be kept below the water surface if at all possible. The force of strongest winds against the structures are small compared with the force of breakers at the crests of high waves. Dynamic pressures on a flat plate of over 1,000 lb. per sq. ft. are common at breaker tops.

Results of Engineering Study

The oceanographic and meteorological investigation forming the basis for this report was prepared by Oceanographer Paul L. Horrer and Meteorologist Loren Crow, under the direction and supervision of Dr. Irving P. Krick and Robert D. Elliott.

Practically no records exist as to what the actual sea and swell conditions have been at any particular well drilling site. However, the technical skills of oceanography combined with meteorology do provide a means

The Author

Techniques described herein have been engineered for and are being applied to current oil-drilling operations (see accompanying photo) in the Gulf of Mexico by Dr. Irving P. Krick and his staff at the American Institute of Aerological Research. Staff members of the Scripps Institution of Oceanography have collaborated on the actual preparation of oceanographic surveys.

Dr. Krick is a professional meteorological consultant and president and chairman of board of trustees, American Institute of Aerological Research; chairman and managing director, International Meteorological Consultant Services, Ltd., London, England. He was born in San Francisco, received his A.B. in physics at University of California in 1928, M.S. in meteorology at California Institute of Technology (1933), and Ph.D. at Cal Tech in 1934. He was faculty member at Cal Tech 1933-1948.

The American Institute of Aerological Research is a nonprofit California corporation for conducting scientific investigations in pure and applied research in aerology and related geophysical sciences, maintaining laboratories for scientific and industrial aerological research.

Drilling platform discussed in this article

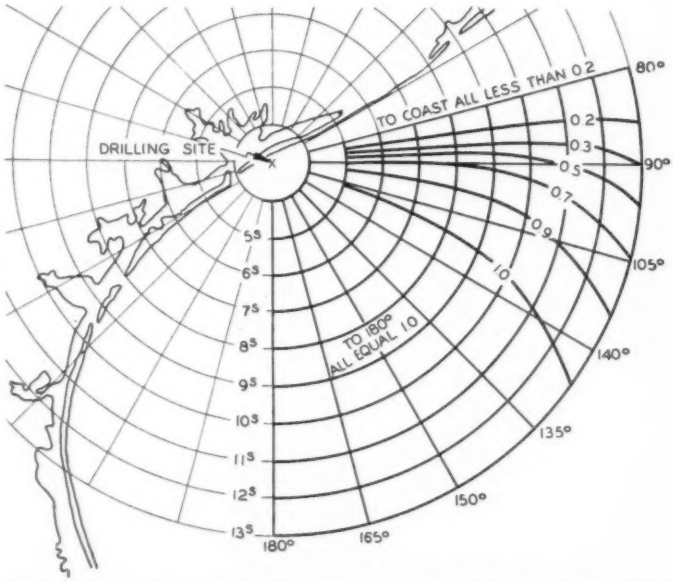

Fig. 3—Refraction graph for area off Matagorda Peninsula (radials indicate compass direction; concentric arcs indicate wave period in seconds; curves are drawn for constant values of refraction factor)

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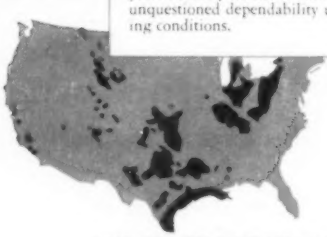

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of calculating past oceanographic conditions from recorded weather data.

Lacking actual records of waves at the drilling site, computations of wave characteristics for all cases during a 40-year period in which wave heights at the drilling site would have attained 10 ft. or more, were made. These calculations were based on an application of a wartime-developed wave-forecasting technique to a 40-year series of daily weather charts embracing the period from January 1899 through April 1939.

From summaries of wave characteristics thus computed, frequencies of various wave stresses to be expected on the drilling structure were computed, and appear in tabular form. A curve was prepared showing the risk of waves attaining or exceeding various heights above the ocean bottom during any year.

This, in conjunction with the computed wave forces for various wave heights, can then be used in calculating probable risks for a given structure at a given location.

Results show that in only one instance in the 40 years would waves have broken over a platform located 27 ft. above mean water level. The maximum dynamic pressure which would have been experienced by a flat vertical surface on the drilling platform in this case would have been 5,170 lb. per sq. ft. at a height of 9 ft. above the platform. The upward pressure on the drilling platform itself in this instance would amount to only 177 lb. per sq. ft. The maximum pressure on the side of a 30-in. piling would have been 185 lb. per sq. ft.

An estimate of the effects of currents on sedimentation was also made, and showed that sedimentation should provide no serious difficulty in the operation of this installation. But in some locations the effect of the prevailing ocean currents moving past a structure fastened to the bottom will produce certain unfavorable disposition or erosion of the sediment around the piling bases.

Rarely has the design of structure affected by wave action been based upon quantitive estimates of essential wave characteristics. As a consequence, many of these structures have failed to produce the desired results or have collapsed under the forces of wave action. Others have been designed to withstand for greater wave energy than is ever encountered with a resulting waste of material and construction time. Changes in the shore line and beach are due partially to the movement of sand by the orbital motion of the water in the waves and partially to sand transport by longshore currents. Therefore, combination wave and current studies are essential for an economic solution of problems involved in design of most marine structures.

In order to compute the effect of wave action on this or other structures, it is first necessary to know the normal frequencies of various wave heights, periods, and other characteristics at a given locality. Records of waves are kept at only a few places and are not available at or near the subject drilling site. Fortunately, a technique was devised during the war whereby satisfactory computations of expected wave heights can be made on the basis of data appearing on daily weather maps and the known submarine topography in the region. Two steps are involved in this procedure, the first being the computation of wave characteristics such as height, length, period, and speed of propagation in the area where they are generated by wind action. These waves are called "deep water" waves. The second step is that of computing the modifications imposed on deep-water waves as they move into shallow water. These modifications may be either in the direction of increasing or decreasing heights and often involve the formation of breakers.

Meteorological Considerations

Waves are generated when strong winds blow for a long time over a fairly long stretch or "fetch" of ocean surface. In general, the higher the wind, the longer the fetch, and the greater the duration of wind, the higher the waves thus generated. Once formed, the waves move swiftly out of the locale of the strong winds and proceed with gradually diminishing heights through less windy or calm regions for hundreds of miles before their height becomes negligible. It is therefore necessary to study weather patterns over the entire Gulf of Mexico in computing wave heights for the subject drilling site. The date source used in this study was a 40-year series of daily weather charts which adequately covers the gulf and adjacent areas. During the course of examining these charts a number of pertinent meteorological observations were noted.

From November through May, winds responsible for 10-ft. or higher waves at the location in nearly all cases blew from the SSE or SE and were strong from the Gulf of Campeche or Yucatan up to the location itself. They almost invariably preceded a "norther."

From June through September, such winds and the resultant waves moved across the gulf from a more easterly direction. Eighty-seven per cent of these waves were generated in tropical storms, of which some 70 per cent apparently had hurricane force winds over a fairly large area. In these cases the wave heights at the location were the greatest. It is interesting to note, however, that less than half of these storms drew close enough to the subject location to produce any exceptionally strong winds. Only 24 cases of tropical storms were found in the 40 years studied which produced 10-ft. or higher waves at the location. Many other storms occurred in the gulf area during the 40-year period but were too far from the subject drilling site for the waves they generated to be 10 ft. high by the time they reached the location.

October was a transition month in which both SSE and SE waves and tropical storm waves occurred.

Computation of Theoretical Maximum Wave Heights at the Site

In determining the risk of damaging wave action on drilling structures it is assumed that the worst possible wave conditions which may occur are of primary interest. In shallow water the maximum wave height at any depth is associated with a wave whose characteristics are such that it breaks at that depth. A breaker produces a much greater stress on installations than would a wave even if it had exactly the same height, therefore this condition must be considered in detail. The stated water depth of about 40 ft. at the drilling site off Matagorda Peninsula refers to the time average of the water depth at the well location. In a heavy storm, water is piled against the shore due to wave transport and wind stress on the water surface. Under such circumstances the average depth of water at a given location would be greater than the average depth at the same locality before the storm. This rise in mean water level, known as storm tide, is especially pronounced when the "eye" of the hurricane passes to the left of a given location and may be of the order of 5 to 10 ft. in shallow water. In such a storm, a mean depth of about 47 to 48 ft. could be produced at the drilling site.

Factors in Wave Characteristics at Site

Although waves out at sea in deep water have essentially the same characteristics over large distances, upon entering shallow water these waves are transformed under the influence of bottom topography. The effect of bottom features upon waves is known as wave refraction. In order to examine the effects of the bottom on waves approaching the area off Matagorda Bay, a number of refraction diagrams were first constructed on small-scale charts, showing the approaches to Matagorda Peninsula. This type of presentation gives a overall picture of the area's protection from, or exposure to, waves from given directions.

A total of 15 refraction diagrams were drawn for various directions and periods. The composite refraction graph shown in Fig. 3 was constructed

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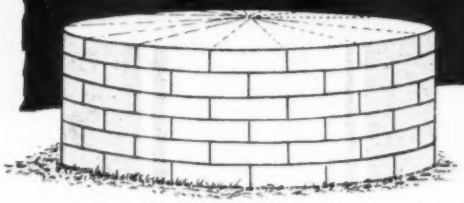

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to summarize the K factors obtained on all the diagrams drawn for the area off Matagorda Peninsula. On this diagram the K factors may be found for any period wave approaching the site from any direction. These K factors and other shallow-water corrections were applied to the computed deep water wave heights to obtain the true height at the site.

The results are shown in Table 1.

TABLE 1

Frequency of Cases of Computed Wave Heights of 10 Ft. or More at the Drilling Site (For Period January 1899 Through April 1939)

Month—	Wave height in feet— 10-14.9	15-19.9	20-24.5	25 or more
January	7	0	0	0
February	7	0	0	0
March	4	0	0	0
April	9	0	0	0
May	2	0	0	0
June	3	2	2	0
July	3	0	1	0
August	3	1	1	2
September	1	2	0	1
October	6	2	1	0
November	7	0	0	0
December	8	2	0	0
Total	60	9	5	3

Individual cases when the wave height exceed 25 ft. extracted from above table:

Height (ft.)	Remarks
37	This wave would break at the site with a storm tide of 7 or 8 ft. It is estimated that the storm tide reached this value, as high tides were recorded at various points on or near the Texas coast.
29	There would be same breaking at the site with no storm tide. Some storm tide did occur according to records from various points on or near the Texas coast.
30	There would be some breaking at the site with no storm tide. Some storm tide probably did occur.

The figures in this table give the number of particular cases of weather situations in which the indicated wave heights were reached. No waves of less than 10-ft. height at the drilling site were considered. The duration of waves of the indicated height in each case usually ranged from 12 to 24 hours. These data are broken down according to months. Due to refraction effects, wave crests traveling in from almost any direction are bent nearly parallel to the coast so this factor is not tabulated.

From the original data there was prepared a curve of the probability of the wave crests reaching or exceeding various heights above the ocean bottom in any one year. These appear in Fig. 2. Because wave characteristics varied considerably from 1 year to the next, these curves were not based upon the wave frequency summary but were computed from the original data.

Computation of Wave Force on Piling

Munk has shown that the force exerted on a structure by waves is related to the particle or orbital motion of the wave. The dynamic pressures exerted by the tops of breaking waves represent the worst possible pressure to which structures may be subjected by wave action because at the very crests of breaking waves the orbital velocity is at a maximum. At this point the wave velocity and the orbital velocity are equal. In Fig. 1 are shown the calculations of wave forces against a 30-in. piling along with the probability of a wave crest attaining or exceeding that particular height in any given year.

Location and Orientation of Breakwaters

In shallow water near the coast line, it is possible to use some form of artificial breakwater to protect the drilling structure. As a part of the oceanographic survey, the predominant direction from which the highest

(Continued on page 275)

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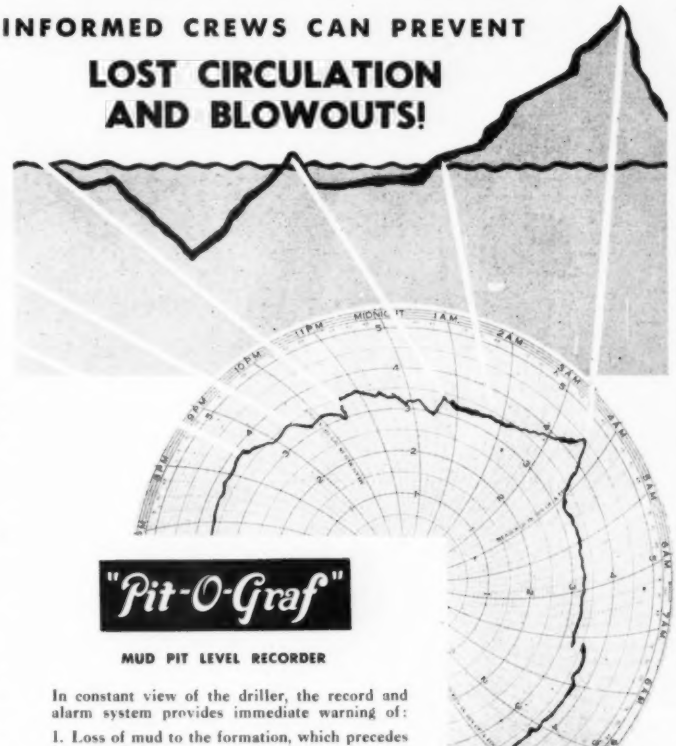

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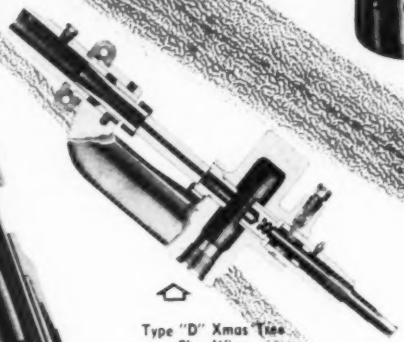
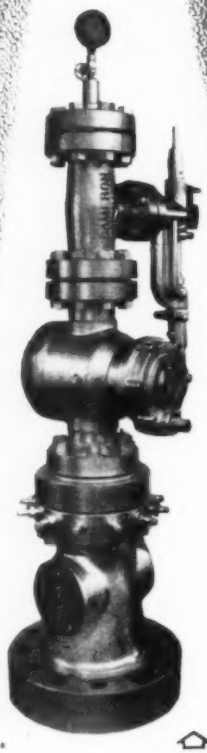


Type "D" Xmas Tree Flow Wing

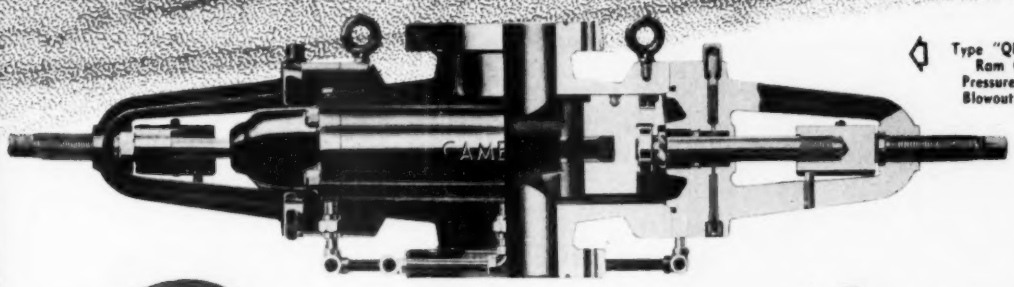
Type "K" Circulating Anchor Packer

Xmas Trees assembled on Type "LD" Ram-Type Tubing Control Heads

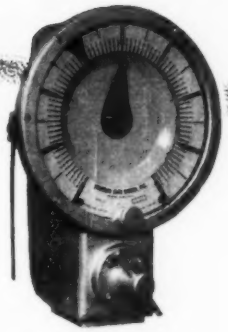


Forged Steel Xmas Trees assembled on Type "F" Lock Screw Tubing Heads

Type "F" Xmas Tree Flow Wing

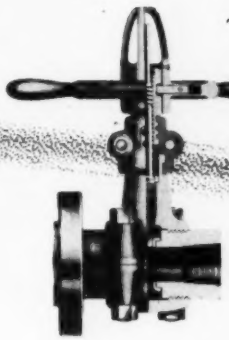


Type "QRC" (Quick Ram Change) Pressure-Operated Blowout Preventer

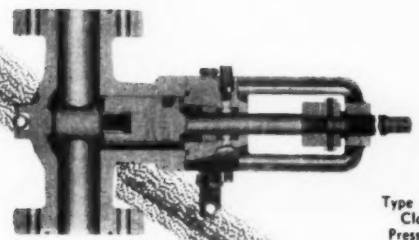


Type "E"—Weight-On-Bit Indicator

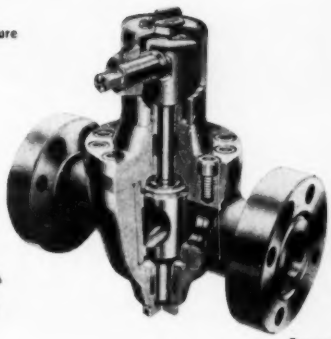
Mud Line Pressure Gauge



"Flex-Seal" Mud Line Valve



Type "HCR" (High Closing Ratio) Pressure-Operated Gate Valve



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waves approach is determined. This allows the breakwater to be so oriented as to afford the greatest protection.

The knowledge of possible wave heights and forces is useful in determining how high and how strong the breakwater must be.

Conclusion

It must be reiterated that this survey was made for a particular drilling site in the Gulf of Mexico and is definitely not directly applicable to any other in the gulf. Although the same approach is made in studies of this type for other areas, the results may differ considerably only a few hundred feet away, because of differences of bottom features, variance in hurricane frequency, and many other factors. Thus, separate and distinct surveys have to be made for any new location that is to be drilled.

Once construction work has begun, the problem of continued operation with the greatest safety and least delay due to inclement weather conditions appears. Personalized consultant services are being utilized by many of the oil companies concerned with offshore drilling problems in the gulf. With the advent of the hurricane season, this type of service becomes even more important and provides the interpretation of public weather information into practical, useful, accurate forecasts specifically applied to the operation at hand.

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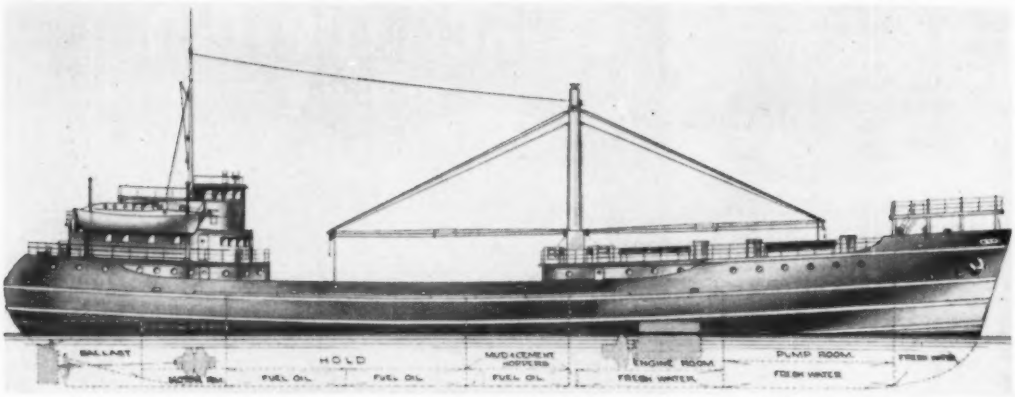

Fig. 1—This drilling tender designed for future construction incorporates experience from presently converted war-surplus vessels. It is designed for moderate first cost and operating and maintenance economy. Dimensions are 234 by 44 ft. with 12-ft. draft and a capacity for 1,400 long tons of drilling supplies. Three 600-kw. generators provide power for drilling as well as for propelling the ship and general purposes

The OIL, the SEA, and the SHIP

by Jerome L. Goldman*

THE oil, the sea, and the ship—words that have long been related but only recently given added meaning in the Gulf of Mexico offshore drilling operations. For while in the past the ship has been one of the prime transporters of oil, it now has taken a place along with the derrick and draw works as an essential element in the drilling and producing operations as well. In accord with this new position it may be well to look at the marine side of these operations, make some observations on present practice, and examine some future possibilities.

*Naval architect and marine engineer, New Orleans.

Drilling for oil in protected and inland bodies of water is a highly developed and successful operation, but the extension of this work to the gulf has encountered new obstacles in the forces of the open sea. For the great majority of the time the sea is fairly smooth to moderately rough, allowing able craft to function unimpeded. But not infrequently the strong winds create heavy wave motion, and this combination of wind and sea prohibits the delicate operations common to offshore drilling, such as transfer of personnel and cargo between ships and to the platform. Occasionally these forces are so great, during storm conditions, that all thought of working is set aside and the vessel labors for preservation.

Any vessel working regularly in the open sea must be able to safely withstand these forces, for some time or other she will have to face them and the only alternative is loss of ship, cargo, and men. All offshore vessels must be seaworthy, a term applied to a ship whose hull, machinery, and equipment are sufficiently sound, structurally and mechanically, to enable her to carry out the functions for which she is designed with full safety to ship, men, and cargo.

Before examining the actual offshore marine operations, it is in order to review the economics behind marine equipment, and the vital phases of analysis, design, and construction of boats to best carry out this work. For the former subject, economics, the author has observed that the entire process of drilling is not much different from that used inland, except for the use of a platform and the need of seagoing vessels for tenders and transportation purposes. If present offshore drilling costs are very high, certainly much of it can be attributed to these new elements. Platform cost reduction is outside the author's ken, but some economy should be possible.

It is in regard to marine equipment that the author feels real economies can be made, economies that may change the over-all drilling and production costs from their high levels to a profitable and competitive basis.

Fig. 2—This offshore drilling crew boat was converted from a war-surplus air-sea rescue boat. It is 104 by 19 ft. 3 in. with 6-ft. draft. With two 400 b.hp. eight-cylinder diesels it has a trial speed in excess of 17 m.p.h. (Photograph courtesy of The California Co.)

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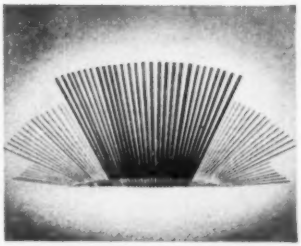

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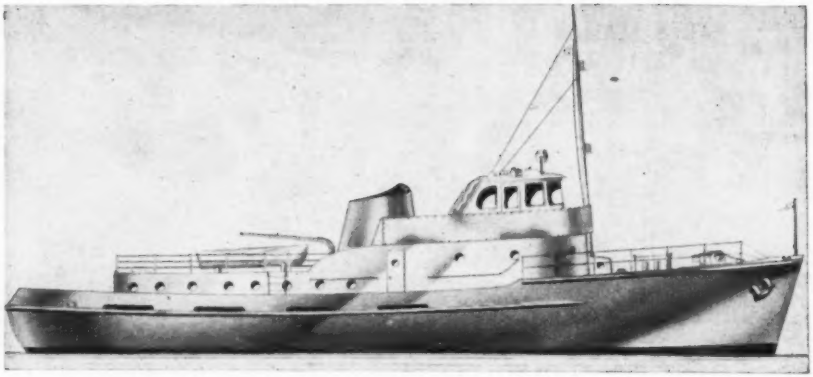

Fig. 3 — This outboard profile is of a proposed steel-hulled, twin-screw crew boat 86 ft. 9 in. by 17 ft. 6 in. and a draft of 6 ft. with 26 tons deadweight. It emphasizes a trend toward building specially designed crew boats with heavy steel hulls, seakindly hull forms having good freeboard, rounded lines with moderate flare forward, and a cruiser stern or a trawler-type transom stern. Heavy-duty diesels providing 500 b.hp. will propel this vessel at a top speed of 14.5 m.p.h.

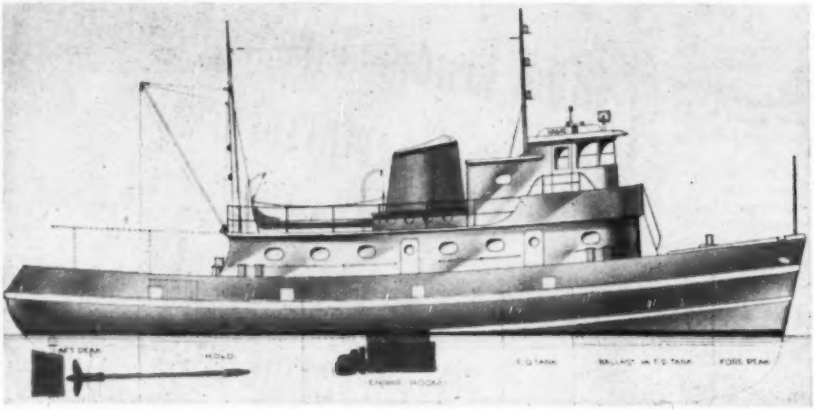

Fig. 4 — This crew-tug boat is a recent development in multipurpose vessels. It is 85 ft. 6 in. by 20 ft. with a 4-ft. 11-in. light draft and a 7-ft. 6-in. loaded draft. It has 5/16-in. steel shell and can carry 60 tons of cargo with gear to handle it. The two engines deliver 500 b.hp. for a free running speed of 13 m.p.h.

These economies will result from new and superior equipment, and from operation that will attain high rates of utilization from the least amount of marine equipment.

Obtaining of new equipment may be said to consist of analysis, design, and construction. This is the same course developed by shipowners to meet modern conditions, and the oil companies have adopted this practice with few modifications. When a company decides to drill offshore the first step is to study the operations of other firms, noting the successes and, just as important, the failures of the marine equipment.

These requirements are then turned over to the naval architect, whose function is to transfer them into a design that will completely satisfy the requirements, and at the same time be economical to build, feature simplicity of operation, be efficient, seaworthy, and seakindly. While it is necessary for a good design to satisfy all the requirements, any major excesses, such as in speed or carrying capacity, means a larger, more expensive vessel than wanted, and the owner will have to pay for it; that is not good design.

The naval architect through the use of his special engineering training and experience takes the requirements and makes a preliminary design that has a length, breadth, depth, draft, displacement, hull form, power, and arrangements to suit them. These data and plans are studied by the owner, who is able from this information to see what his vessel will be like, and any design changes can be easily made at this time. The naval architect then incorporates all such changes in the final design.

The basic dimensions are checked

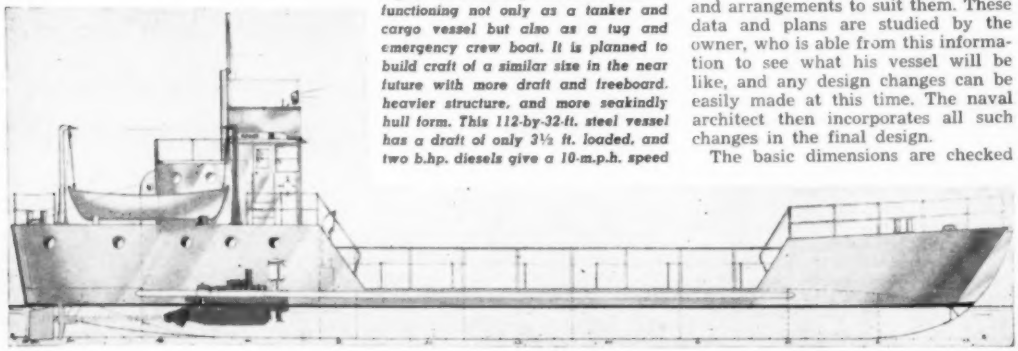

Fig. 5—This recently converted L.C.T. is functioning not only as a tanker and cargo vessel but also as a tug and emergency crew boat. It is planned to build craft of a similar size in the near future with more draft and freeboard, heavier structure, and more seakindly hull form. This 112-by-32-ft. steel vessel has a draft of only 3½ ft. loaded, and two b.hp. diesels give a 10-m.p.h. speed

and modified by detailed analysis of the complicated structural design, the vital calculations concerning stability under the infinite number of possible operating conditions, flooding calculations to assure preservation of the ship despite limited damage to the underwater hull, machinery and propeller design to attain the required speed, detailed weight studies to assure that the ship and cargo will float at the proper draft and trim and that the center of gravity of the ship under various conditions suits the stability and flotation characteristics.

The qualities of good steering, easy rolling and pitching, and all the other features of seakindliness are given the design. The plans and specifications are diverse as the floating city that will result, having hotel facilities for sleeping, eating, and recreation; heating and ventilation, and often air conditioning; space for cargo storage and machinery for handling the cargo, lighting and electric power; fire-fighting equipment; live-saving equipment, navigation outfit, and so on for a very long and impressive list.

Speed and Draft

Two of the most frequent design difficulties for offshore craft are speed and draft. The speed of a vessel is strictly limited by the length, form, weight, etc. Of these the length is by far the most important, and the relation of speed to the square root of the length, $V \sqrt{L}$, the speed-length ratio where V is the speed in knots and L is the water-line length in feet, is the fundamental relationship. Every hull has a speed range which it is uneconomic to exceed, and the following are typical values: self-propelled drilling tenders, 0.6 to 0.8; tug boats and crew-tug boats, 1.0 to 1.2; crew boats, 1.2 to 1.5; and for barges, 0.5 to 0.7.

Concerning draft, this is often limited by channel and harbor facilities, and this contradicts the need of large draft for good sea-going performance. Allow all the draft possible, but where shallow draft is necessary a compromise design must be developed. Here it may be possible to use the old tugboat practice of providing large ballast tanks, filled in deep water to make a heavy and easy sea boat, and quickly pumped out when entering shallow waters to lighten draft.

The next step is to construct the vessel, and the process of selecting the bidder is usually on a competitive-bid basis. The competitive bid has come to be almost universally used in all major marine work, and for good reason. Jobs awarded without competitive bids often run 25 to 50 per cent higher than the bid would, because there is no incentive to put in the best possible price. The complete plans and specifications enable the builders to make detailed esti-

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mates and leave little question as to the finished job, thus directly eliminating difficulties encountered from incomplete information. On the other hand, too much detail and verbosity make the job look more complex than it really is, resulting in higher quotations.

Offshore oil operations can be separated into four phases for treatment, viz., exploration, construction, drilling, and producing. The work of exploration is carried out from a team of small boats equipped with devices for the geophysical work of surveying, shooting, and recording. At present the great majority of the boats used are surplus military craft and local work-boat types, of which a few are of steel and the rest of wood construction. A few specially designed steel craft were built, and these have proved satisfactory even though much equipment has been added since the design was made and crowded everything.

The extension of exploration to deeper and more distant waters indicate a need for sturdy steel-hulled boats, seakindly to minimize downtime due to weather, reliable diesel machinery, and comfortable accommodations. The boats carrying the recording equipment may be about 80 ft. long, with smaller craft for the other services.

Construction of Platform

The next phase, where a drilling platform is to be employed, is to construct the platform, and here again the previous methods used in protected waters have been employed with modifications forced by the open sea. At first most of the tugs, barges, floating derricks, quarter boats, and other craft were acquired from surplus or adapted from previous construction work. Already new equipment of a more suitable nature is being designed and built, stressing greater strength, stability, seaworthiness, power, and seakindliness. In general the trend will be to a lesser number of vessels for a given job, but these will be larger, sturdier multipurpose craft, and may bring platform costs down when they come into use.

The drilling operations are next undertaken, and here the marine equipment may consist of submersible drilling barges, drilling-rig tenders in conjunction with platforms, or large platforms eliminating the use of the tenders; all the above rigs have similar service requirements for crewboats, tugs, barges, and supply vessels. The submersible drilling barge is, perhaps, the optimum means of drilling in shallow water, and is being used with some success in waters up to some 20 ft. deep. Most of these barges were originally designed for inland use and do not appear entirely satisfactory in the open sea. One such

barge, however, has been designed for this work and recent reports indicate excellent performance.

The offshore drilling barge must be stronger than the inland type, with machinery and working levels high above the water. Some form of bottom corrugation may aid in preventing horizontal movement, and a larger slot may help minimize the possibility of the barge swinging into the casing while being floated and moved away. It seems likely that suitable offshore drilling barges will be constructed in number to drill in the vast shallow gulf areas, and should some means become available to extend the use of such rigs in waters up to 100 ft. deep, as is now being developed with good prospect of success, such rigs may provide one major solution to economical offshore drilling.

The use of the drilling tender in conjunction with a platform has been the most common method used to date. Such drilling tenders have been converted from surplus L.S.T. ships and Y.F. barges, both characterized by large open holds for easy adaptation. The scope of these conversions vary, the usual well-equipped tender having accommodations, storage facilities for drilling supplies, material-handling system, mud system, cement system, and a few of the L.S.T. vessels are self-propelled to eliminate the standby tug.

Cost of Conversion

A typical L.S.T. conversion averages about a $750,000 investment when complete. These craft have been doing a good job, but perhaps not an economical one. The conversion costs are high, many compromises were necessitated by existing features, the full forms are ill-formed for seakindliness, operating costs are high, and so are maintenance figures. With the valuable experience gained from these conversions, and the knowledge we now have of the work and conditions offshore, we can design and build superior and more economical tenders.

The new tender should be heavily built of steel, with sturdy fenders against which the smaller craft can lay. The hull form must be extremely seakindly in the anchored condition, with moderate and slow pitching and rolling tendencies, and an easy surging motion. There are needs for model experiments to determine the proper shape, but experience suggests a full-ended, V-type bow and stern form, similar to the Maier-form type, with double-chine type bilge and very large bilge keels.

The arrangements should have the drilling machinery at one end, with the cargo spaces in the center, and the accommodations at the other end farthest from the vibrations and sounds. If self-propelled, the power source may be a diesel or turbo-electric plant, supplying all power for the drilling operations, including the platform, and to electric propulsion motors located at the aft end of the tender.

Mooring equipment can be kept off the weather deck, mud and cement handled by conveyor from hopper storage, and use of the mast-boom-winch cargo-handling system continued until a better method is developed. These refinements are incorporated in the tender illustration shown in Fig. 1 and the result is a compact and workable tool.

The Crew Boat

The crew boat is a necessary auxiliary to offshore work, carrying men and light cargo. Aside from a few small steel boats, the vast majority of these numerous craft are surplus military types varying from 63 to 104 ft. in length, lightly built of wood, with high-speed diesels replacing the original gas engines (see Fig. 2). These craft were designed for intermittent rescue work and the high-speed hull forms are very inefficient with the low-powered engines now installed. They are not good seaboats under way, and even less so alongside the tender, as they are very lively. The lightly built hulls, necessary for their original purpose, are a source of great upkeep and repair expense, and make these very expensive craft over a period of time.

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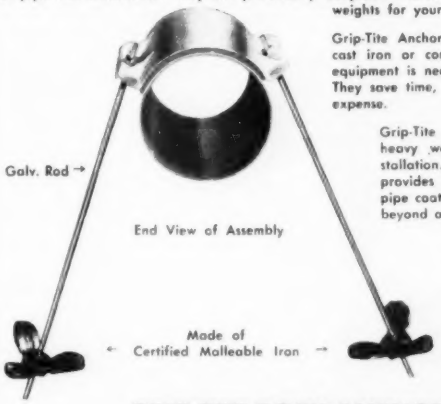

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The trend is just getting under way in building specially designed crewboats, featuring heavy steel hulls, with seakindly hull forms having good freeboard, rounded lines with moderate flare forward, and a cruiser stern or a trawler-type transom stern. Medium-speed heavy-duty machinery will drive two propellers, and speeds will be about 12 to 15 m.p.h. for boats 75 to 90 ft. long.

Recent study indicates that a crewboat serving one tender and standing by, either in port or alongside the tender, some 75 to 90 per cent of the time is an uneconomic situation. Large crewboats are expensive standby boats, and are actually ill suited as life-saving craft under some conditions. Perhaps it may be well to develop a special standby boat, about 35 ft. long or so, carried on gravity davits and available for escape and rescue work. This would relieve the crewboats and allow more time under way, and also allow development of some craft that can do a good light towing job and carry up to 50 tons of cargo, as well as transport men. Figs. 3 and 4 show some recent thinking about crewboat design.

The transport of fuel, fresh water, drilling materials, and other heavy commodities is being carried out by self-propelled vessels and by the tug-barge combination. The former is best exemplified by the extremely useful L.C.T. conversion, and the profile of the most recent conversion from the author's office is shown here (see Fig. 5). This boat, provided with powerful twin-screw machinery, large streamlined rudders, and excellent accommodations has been in service for a few months, and her usefulness can be seen in that it functions not only as a tanker and cargo vessel, but as a tug and emergency crewboat as well, all of which service she has well performed. New craft of similar size, with more draft and freeboard, heavier structure, and a more seakindly hull form will be built in the future.

The tug-barge operations are similar to those employed in seagoing work elsewhere, and is a low cost, flexible form of transport for bulk cargoes. Future barges should have easier towing forms, with special attention given to any elimination. Tugs are becoming more powerful and able, and weight is of great importance, for the success of a deep sea tow is proportional to the weight of the tug and the length of the towline.

The final phase of offshore operations, and one which every operator looks forward to facing, yet dreads when it is a reality, is production. This phase is now receiving serious study and various possibilities are being considered. The servicing of the wells can be done with small steel diesel boats, about 50 ft. long, carrying men and their equipment to the various wells in the field; heavier work can be done by the craft used in the drilling operations.

The storage and transport of offshore oil economically presents a larger problem. Storage can be in the form of a floating tank vessel moored near the well, or a tank supported by a structural system. Both will be used, and the fixed tank will become the more common. Transportation can be by pipe line, barge, or tanker, and here only a comparative study of location, quantity of oil, capital costs, and other factors will show which is most economical. All three will be used, and even the pipe-line installation and tending will require marine equipment.

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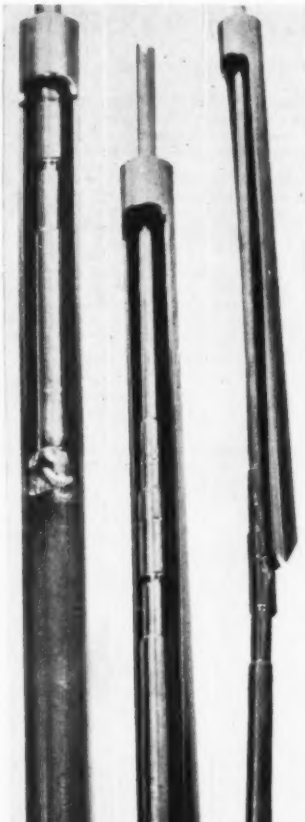

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Pictured at left, position of tool going in hole. Center, operator is drilling off the face of the knuckle guide. Right, drilling below the knuckle guide. Note the 4° knuckle action of the lower part of the tool.

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BOOKS

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This is a concise and readable book dealing in a comparatively elementary manner with the very wide subject of fuels and lubricating oils for internal-combustion engines. It should be useful to students of aeronautical, automobile, and oil engineering, and fuel technology, as well as for junior members and the staffs of oil companies and transport organizations. A chapter is devoted to hydrocarbon chemistry, presenting structure, nomenclature, and summary of properties of paraffins, olefins, aromatics, and naphthenes. Other chapters deal with manufacture of fuels and lubricants, combustion, antiknock rating of fuels, and general principles of engine lubrication.

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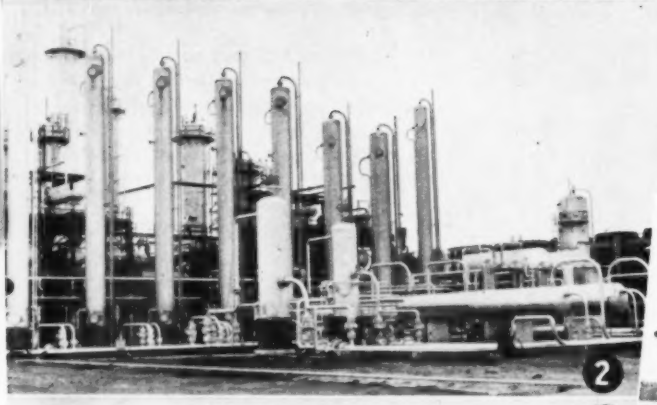
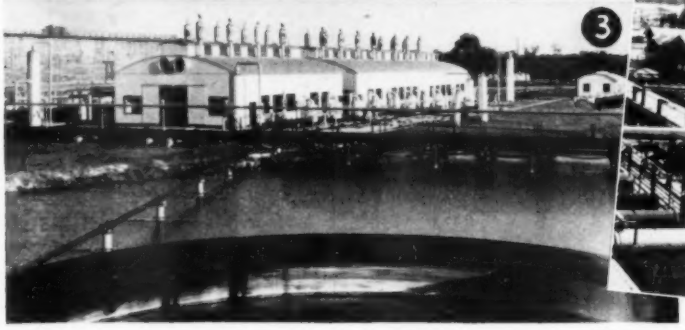
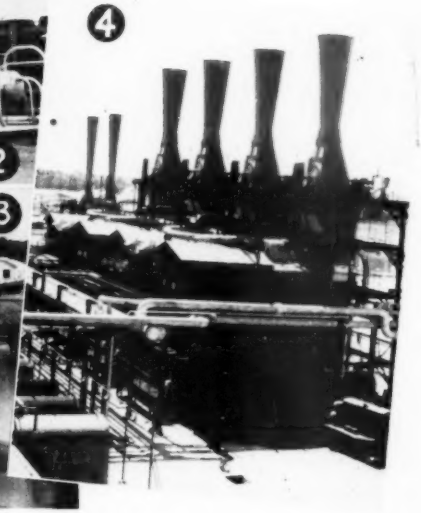
Revision Program Completed at Old Ocean Unit Gasoline Plant

by W. F. Bailey







AN extensive revision program has been completed at the Old Ocean unit gasoline plant—the second largest gasoline plant on the Gulf Coast. The plant is operated by J. S. Abercrombie Co. as unit operator for the other operators of the Old Ocean unit, and is located near the town of Sweeny in Brazoria County, Texas. The revision program was carried out by Delta Engineering Co. of Houston, and includes installation of inlet condensate and crude oil separators, equipment for higher propane recovery, and crude and condensate stabilization facilities for the unitized operations.

The first well in Old Ocean field was discovered on November 8, 1934, and subsequent drilling led to the discovery of four major reservoirs all of which are a part of the Frio for-

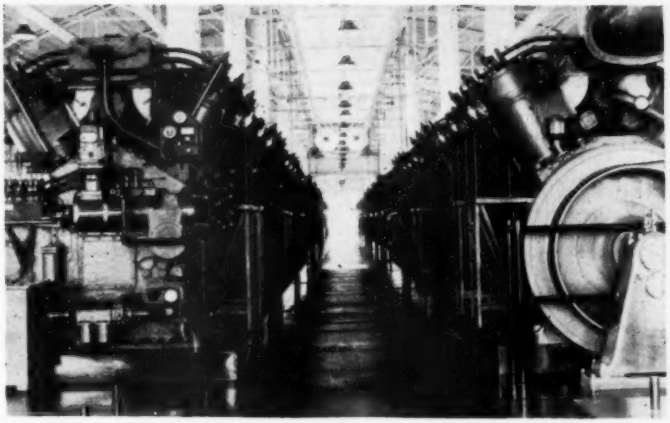
1—Stills, fractionator towers, and butane storage tanks

2—Inlet separators, absorbers, and still sections

3—Pressure-maintenance-plant building

4—Six boilers produce 500,000 lb. of steam per hour

W. F. Bailey, process engineer for J. S. Abercrombie Co.'s Old Ocean field plant, received his higher education at Cameron College and Oklahoma A. & M. in chemical engineering. Prior to his joining J. S. Abercrombie Co. in February 1945, he was employed by The Texas Co. (1942-1945) at its Salem plant, Salem, Ill., in the maintenance and construction departments. In June 1937 he was employed as plant clerk in the natural-gasoline department of W. F. Waggoner estate, Vernon, Tex.



View of the twenty-two 600-hp. compressor units, for pressure maintenance

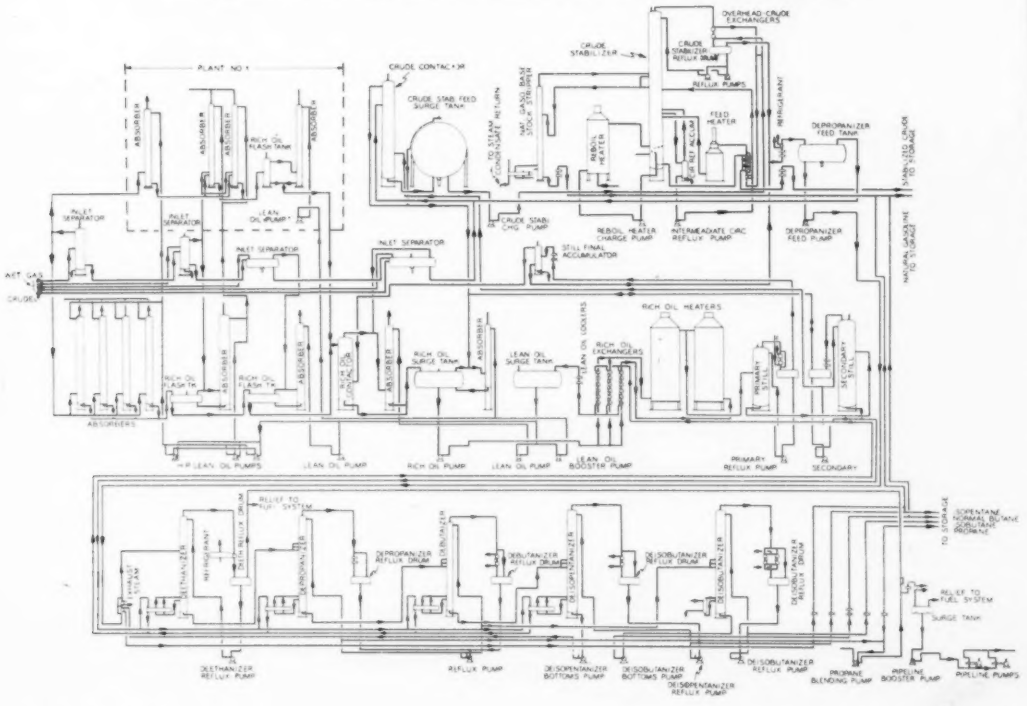
mation. The major reservoirs in the order of discovery are as follows:

Date—	Reservoir	Depth (ft.)
September 11, 1936	Armstrong	10,000
February 28, 1937	Campbell	10,300
July 26, 1937	Larsen	10,600
September 23, 1938	Chenault	9,700

In 1939 Stearns-Roger Manufacturing Co. built the first extraction plant for the field. This plant processed about 70,000 M.c.f. per day with absorbers operating at 1,250, 500, and 50 psi. After considerable experimental work was conducted, eight 600-hp. compressors were installed for gas injection at 3,700 psi. During 1941 additional facilities were built to separate isopentane, normal and isobutane, and to produce deisopentanized gasoline. The gas capacity was increased by adding an 1,800 and a 35-psi. absorber and eight 600-hp. compressors. Thus the plant inlet volume was increased to 120,000 M.c.f. per day.

In order to process additional gas resulting from continued field development and to supply liquefied petroleum gases, isopentane, and natural gasoline needed during the war, a second plant was built for the J. S. Abercrombie and Harrison Oil companies by J. F. Pritchard & Co. Although the two plants could be operated independently, the new plant produced lean oil for absorbers oper-

Flow diagram of the Old Ocean plant as expanded, giving equipment and processing details



ating at the 500, 50, and 35 psi. pressure levels in plant No. 1 with flash gases produced at 175 psi. in plant No. 1 being processed in the new unit. This installation permitted the processing of approximately 350,000 M.c.f. per day with twenty-two 600-hp. compressors injecting 240,000 M.c.f. per day at 3,750 psi. into the reservoirs.

During this stage the field operators began an extensive study of the field reservoirs and to formulate plans for conservation of reserves by unit operations. Preliminary measures for unitization were adopted by the operators which included J. S. Abercrombie Co., Old Ocean Oil Co., Magnolia Petroleum Co., Fidelity Oil & Royalty Co., Mound Co., Stanolind Oil & Gas Co., Texas Co., Tide Water Associated Oil Co., and R. A. Welch. Agreement was reached between the operating companies and royalty owners and the initial unit operation began August 1, 1948.

TABLE 3—PLANT BALANCE—J. S. ABERCROMBIE

	Methane		Ethane		Propane		Isobutane	
Residue gas:	M.c.f./ day	Bbl./ day	M.c.f./ day	Bbl./ day	M.c.f./ day	Bbl./ day	M.c.f./ day	M.c.f./ day
1,800 lb.	164,481.3		5,438.7		995.1	649.9	34.3	26.6
1,250 lb.	94,048.9		3,658.5		793.2	518.0	69.4	53.9
500 lb.	29,492.0		1,600.0		352.4	230.2	25.4	19.7
150 lb.	9,947.8		1,105.4		293.0	191.4	18.4	14.3
50 lb.	1,722.1		1,323.8		491.0	320.7	27.1	21.1
Total losses	299,692.1		13,126.4		2,924.7	1,910.2	174.6	135.6
Products:								
Propane	18.7	7.6	656.9	397.5	2,418.6	1,579.8	70.4	54.7
Isobutane					7.7	5.0	1,226.2	952.5
n-Butane							34.8	27.0
Gasoline								
Stab. crude								
Total recovery	18.7	7.6	656.9	397.5	2,426.3	1,584.8	1,331.4	1,034.2
Rec. & losses	299,710.8		13,783.3		5,351.0	3,495.0	1,506.0	1,169.8

TABLE 1—TYPICAL COMPOSITE INLET GAS-STREAM ANALYSES

	1,800 psi.		1,250 psi.		500 psi.		150 psi.	
Component—	Mol (%)	Bbl. per M.M.c.f.	Mol (%)	Bbl. per M.M.c.f.	Mol (%)	Bbl. per M.M.c.f.	Mol (%)	Bbl. per M.M.c.f.
Carbon dioxide	.40		.40		.30		.85	
Methane	92.58		92.39		90.50		86.40	
Ethane	3.97		4.43		5.68		7.42	
Propane	1.55	10.1	1.57	10.3	2.12	13.8	3.21	20.9
Isobutane	.42	3.3	.40	3.1	.47	3.6	.74	5.7
n-Butane	.41	3.1	.34	2.5	.46	3.4	.66	5.1
Isopentane	.17	1.5	.15	1.3	.12	1.0	.22	1.9
n-Pentane	.16	1.4	.11	.9	.13	1.1	.22	1.9
Hexane	.18	1.8	.11	1.1	.11	1.1	.16	1.6
Heptanes-plus	.16	1.9	.10	1.2	.11	1.3	.10	1.2
Total	100.00	23.1	100.00	20.4	100.00	25.3	100.00	38.3

TABLE 2—INLET GAS COMPOSITION FROM PRODUCTS AND LOSSES, DECEMBER 20, 1948

(J. S. Abercrombie Co. Old Ocean Unit Plant)

	Composite inlet stream		
	Mol (%)	Gal. per M.c.f.	Bbl. per M.M.c.f.
Carbon dioxide	.43		
Methane	88.57		
Ethane	4.07		
Propane	1.58	.43	10.318
Isobutane	.44	.14	3.418
n-Butane	.42	.20	3.146
Isopentane	.25	.37	2.172
n-Pentane	.21	.44	3.979
Hexanes-plus	4.03	2.59	51.197
Total	100.00	4.25	74.230

	Products, volume per cent				
	Propane	Isobutane	Normal butane	Gasoline	Stab. crude
Methane	.37				
Ethane	19.47				
Propane	77.39	.52			
Isobutane	2.68	98.63	2.62		
n-Butane	.09	.85	97.03		
Isopentane			.35	30.59	.57
n-Pentane				23.17	.67
Hexanes-plus				46.24	98.76
Total	100.00	100.00	100.00	100.00	100.00

$$\text{Per cent recovery of propane} = \frac{1,584.8}{3,495.0} = 45.34 \text{ per cent}$$

$$\text{Per cent recovery of butanes} = \frac{2,045.3}{2,232.0} = 91.64 \text{ per cent}$$

$$\text{Per cent recovery of pentanes} = \frac{1,349.2}{1,349.2} = 100.00 \text{ per cent}$$

$$\text{Per cent recovery of hexanes+} = \frac{17,139.9}{17,325.7} = 98.93 \text{ per cent}$$

Plant Flow

Separator section.—The gas-condensate wells produce at two pressure levels—1,750 and 1,250 psi. The well streams are metered at the separator stations and flow through cooling coils in the plant, then to the separators.

The 5-ft. 2-in. by 22-ft., 1,800-psi. vertical separator has a capacity of 200,000 M.c.f. per day. The condensate production from the 1,800-psi. separator enters the 5 by 18-ft., 1,250-psi. vertical separator with the 1,250-psi. gas-condensate stream. This separator handles 100,000 M.c.f. per day.

The condensate from the 1,250-psi. separator enters the 5 by 40-ft., 500-psi. horizontal separator with the 500-psi. oil-well and the secondary gases from the 1,750 and 1,250-psi. oil-well separators located at the two stations in the field. This plant separator has a daily capacity of 50,000 M.c.f. The total condensate production from this separator is measured by a displacement-type meter and enters the 6 by 40-ft., 150-psi. separator with the 150-psi. primary, secondary, and tertiary gases as well as the 150-psi. crude-oil production from the two field separator stations.

The combined condensate-crude oil stream is measured by a displacement meter and enters the plant for stabilizing.

Absorption section.—The 1,800-psi. separator gas enters a battery of five absorbers. There are four 4 by 60-ft., 22-tray and one 5 by 50-ft., 16-tray absorbers with a lean-oil capacity of 1,500 g.p.m. The 1,800-psi. rich oil enters a 4 by 40-ft. horizontal flash tank at the 1,250-psi. pressure level for partial deethanization. The flash gas and a portion of the 1,250-psi. separator gas enters a 5 by 60-ft., 22-tray absorber. The remaining 1,250-psi. separator gas enters two 3-ft. 6-in. by 55-ft., 20-tray absorbers.

The total lean oil to the three 1,250-psi. absorbers is about 735 g.p.m. Five 10-stage centrifugal pumps are used for lean-oil flow to the 1,800 and 1,250-psi. absorbers. The pumps are equipped with nozzles at an intermediate stage for the 1,250-psi. lean-oil service, have a combined rating of 3,900 g.p.m., and are powered by turbines developing 6,087 hp. The rich oil from the 1,250-psi. absorbers is flashed into a 6 by 40-ft. horizontal

CO. OLD OCEAN UNIT PLANT, SWEENY, TEX.

n-Butane		Isopentane		n-Pentane		Hexanes+		Carbon dioxide	Total	
M.c.f./ day	Bbl./ day	M.c.f./ day	Bbl./ day	M.c.f./ day	Bbl./ day	M.c.f./ day	Bbl./ day	M.c.f./ day	M.c.f./ day	Bbl./ day
17.2	12.9	.....	.....	.....	.....	85.8	97.2	514.7	171,567	786.6
29.7	22.2	.....	.....	.....	.....	49.6	54.3	495.7	99,145	648.4
6.3	4.7	.....	.....	.....	.....	15.9	16.9	254.0	31,746	271.5
3.4	2.5	.....	.....	.....	.....	8.0	9.1	114.9	11,491	217.3
11.7	8.8	.....	.....	.....	.....	7.7	8.3	80.6	3,664	358.9
68.3	51.1	.....	.....	.....	.....	167.0	185.8	1,459.9	317,613	2,282.7
2.5	1.8	.....	.....	.....	.....	.....	.....	.....	3,167.1	2,041.4
10.9	8.2	.....	.....	.....	.....	.....	.....	.....	1,244.8	965.7
1,336.6	1,001.1	4.1	3.6	.....	.....	.....	.....	.....	1,375.5	1,031.7
.....	.....	748.5	650.2	572.3	492.5	978.3	962.8	.....	2,299.1	2,125.5
.....	.....	107.4	93.3	127.4	109.6	12,493.0	16,157.1	.....	12,727.8	16,360.0
1,350.0	1,011.1	860.0	747.1	699.7	602.1	13,471.3	17,139.9	.....	20,814.3	22,524.3
1,418.3	1,062.2	860.0	747.1	699.7	602.1	13,638.3	17,325.7	1,459.9	338,427.3	24,807.0

plus fraction, to mix with crude before stabilization. The crude also is stripped of methane and ethane by the deethanizer feed tank gas entering at the bottom of the contactor thus operating as the propanizer-absorber or rich-oil contactor. The gas from the contactor is reabsorbed by the 50-psi. reabsorber and the bottoms flow to a 5,000-bbl. crude stabilizer charge tank.

Crude stabilizer.—The purpose of the crude stabilizer is to withdraw butanes and lighter fractions from the combined crude-condensate stream. These fractions would normally be lost in storage weathering.

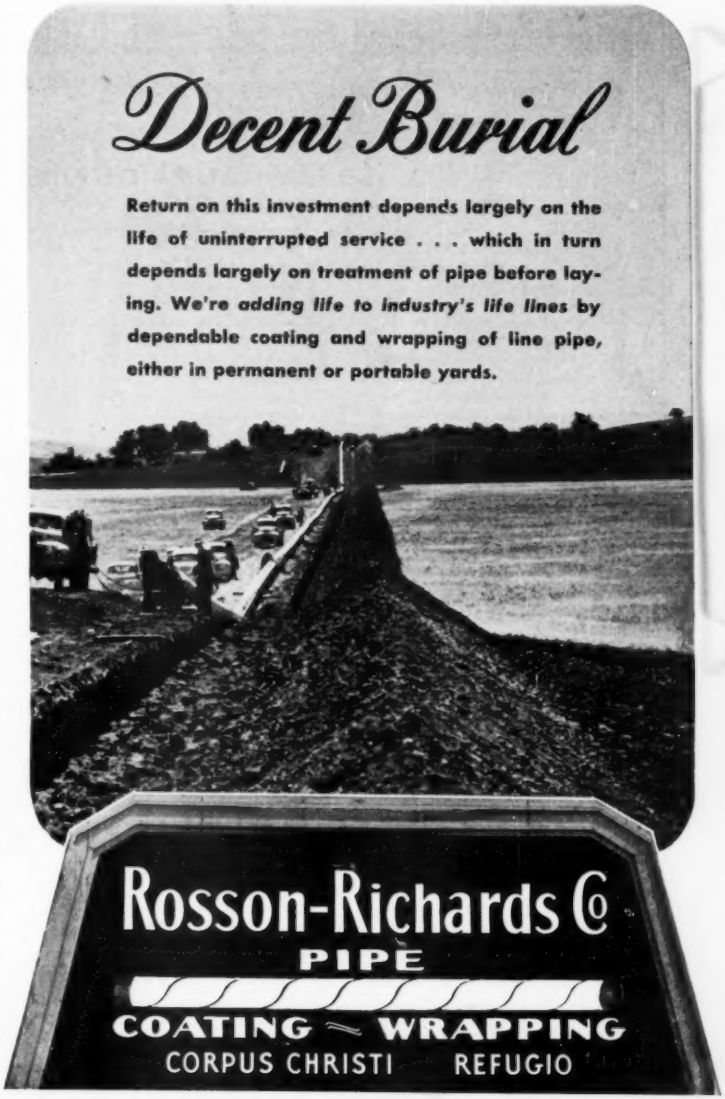
vessel operating at the 500-psi. pressure level. Two absorbers, (5 by 56-ft., 20-tray and 3-ft. 8-in. by 55-ft., 22-tray) process the flash and separator gases.

The rich oil from the 500-psi. absorbers then enters the 10 by 30-ft., eight-tray propanizer-reabsorber or rich-oil contactor at the top tray. The noncondensables from the primary still are released into the bottom section of the tower. As this recycle stream is rich in propane, due to the difference in partial pressure of components, the propane is absorbed by the rich oil and releases considerable quantities of methane and ethane. The gas from the rich-oil contactor enters the 5-ft. 6-in. by 54-ft., 20-tray, 150-psi. absorber with the 150-psi. separator gases. The rich oil from both the contactor and 150-psi. absorber is further deethanized by flashing to 50 psi. in the 11 by 28-ft. rich-oil surge tank. A 4 by 50-ft., 20-tray reabsorber is operated at this pressure for processing the 50-psi. flash and process vent gases.

Still section.—Rich oil is pumped at the rate of 3,600 g.p.m. through three parallel banks of heat exchangers, then to the vertical gas-fired rich-oil heaters. These have a 105,000,000-B.t.u.-per-hour heat-release rate.

The stripping section consists of two stills. The 11 by 39-ft., 12-tray primary still, in which the preheated oil is flashed and the rich oil is stripped of the lighter absorbed components, operates at 180 psi. The still reflux is obtained by a partial condenser and the remaining gas is condensed and collected in the final accumulator with the noncondensables discharging into the rich-oil contactor. The condensed liquid in the still final accumulator flows to a refrigerated condenser and is cooled to 60° F. before entering the deethanizer feed tank.

The partially stripped rich oil flows to the 12 by 57-ft., 18-tray secondary still which operates at 65 psi. The rich oil is completely stripped of the heavier absorbed components. These are condensed and discharged into the crude contactor (8 by 68-ft., 24-tray) allowing the secondary still overhead, which is predominately a pentane-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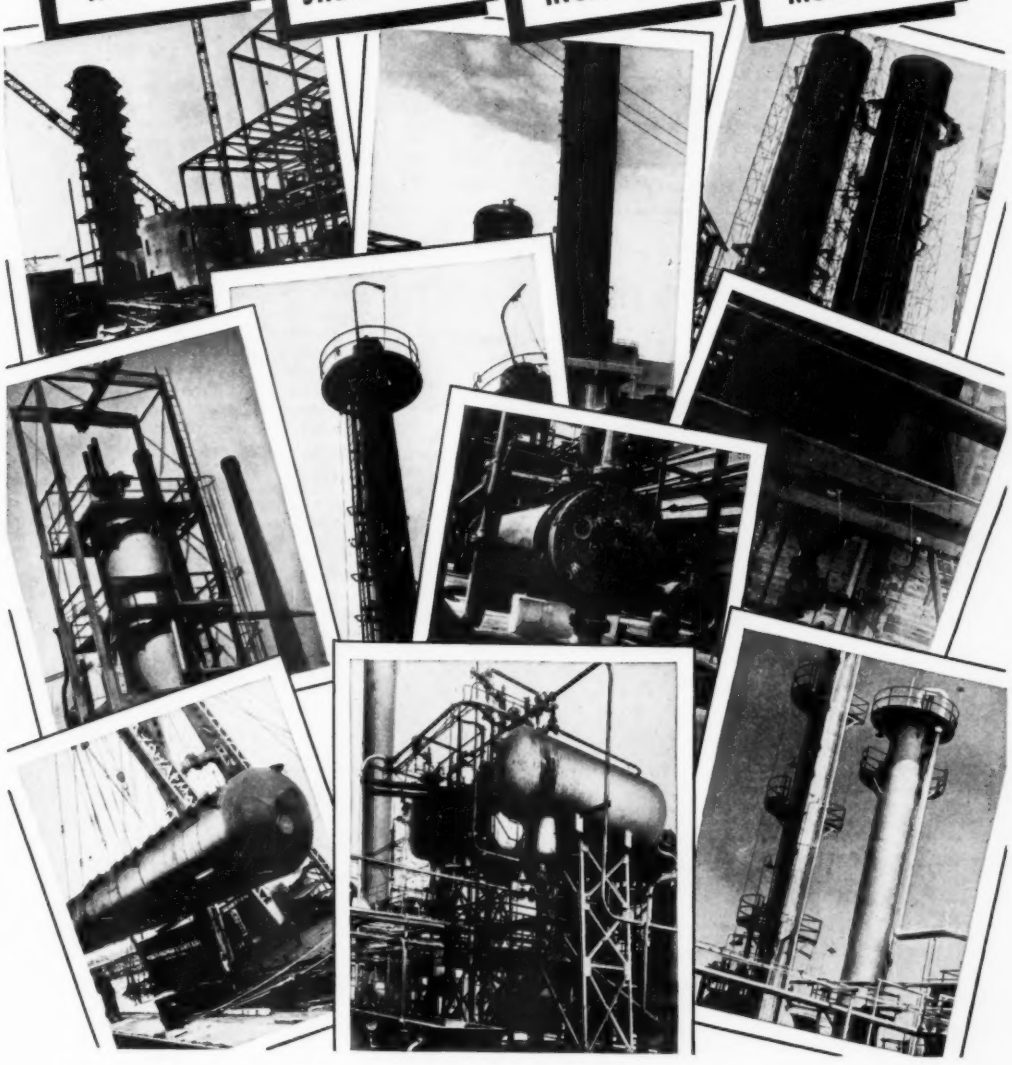

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The crude is charged into the 9 by 100-ft., 40-tray stabilizer unit at the rate of 16,000 to 20,000 bbl. per day. The feed is preheated by heat exchangers and a gas-fired furnace, and enters the stabilizer on the thirty-first tray. A gas-fired reboiler is utilized for "bottom heat" with approximately 780 g.p.m. circulated by pumps and reentering the tower above the bottom tray.

A side stripper is used to recover pentanes-plus from the secondary still overhead production which has been mixed with the crude-condensate stream in the crude contactor. The feed to the 4 by 60-ft., 24-tray stripper is withdrawn from the nineteenth or twenty-third tray on the stabilizer. The feed rate is maintained by a flow controller to withdraw stripper feed at a rate equivalent to the secondary still overhead production. A steam heated reboiler at the base of the stripper is used for controlling the vapor pressure of the gasoline bare stock.

The stabilizer overhead product which contains butanes and lighter fractions is condensed and enters the refrigerated condenser for cooling to 60° F. before discharging into the deethanizer feed tank.

Fractionation section.—The deethanizer column (5 by 66-ft., 24-tray) operates at 400 psi. with the top reflux produced by refrigerated chillers maintaining 60° F. Since the deethanizer charge is predominately pentanes and lighter fractions, the temperature required for the reboiler can be maintained by using 5-psi. exhaust steam with a thermocompressor. The reboiler operates at about 18-lb. pressure, and maintains approximately 240° F. on the deethanizer "bottoms."

The depropanizer (5-ft. 6-in. by 78-ft. 6-in., 36-tray) operates at 210 psi. producing 98.5 per cent pure propane. However, the deethanizer vent gas is blended with the propane producing a 350-lb. vapor-pressure product containing about 75 per cent propane for pipe-line shipment to the consumer.

The debutanizer tower is 5 ft. 6 in. by 61 ft. with 24 trays. The reboiler heat is also furnished by thermocompressor operating at 20 psi.

The deisopentanizer and deisobutanizer are 7 by 117-ft., 50-tray towers. The deisopentanizer is not being operated at present. The deisobutanizer reboiler heat is 5-psi. exhaust steam and produces 98 per cent purity butanes.

Gas cycle.—As previously mentioned, the pressure maintenance plant operates twenty-two 600-hp. compressors. There are 7 units with 1,250-psi. suction pressure, 10 units with 1,800-psi. suction pressure, and 4 units which may be operated in either service. The compressors are equipped with suction scrubbers which have pneumatic-operated dump valves, high-level alarms, and automatic engine-shutoff devices.

Currently, approximately 240,000 M.c.f. per day of gas is injected into 12 wells at 3,700-psi. pressure. The remaining engine is used in compressing 500-psi. residue gas to 800 psi. for gas sales. The remainder of the gas is used for sales, field, and plant fuel supply.

Steam system.—The plant steam is generated by six water-tube boilers operating at 250 psig. and 550° F., producing 500,000 lb. of steam per hour. There are also five oil-field-type, five-tube boilers which are used for standby purposes. The steam is used principally in steam-driven turbines with 5-psi. exhaust steam pressure. The exhaust steam is condensed in surface condensers. However, three of the high-pressure lean-oil pumps and three rich-oil pumps have turbines which exhaust at a vacuum of 20 in. of Hg.

About 85 per cent of the condensed steam is returned to the boiler feed tank. An evaporator utilizing the 5-lb. exhaust steam produces about 60 g.p.m. of evaporated water for boiler feed with the remaining makeup water produced by a lime-soda cold-process softener. The boiler feed tank is a 12 by 35-ft. elevated tank equipped with a mechanical deaerator.

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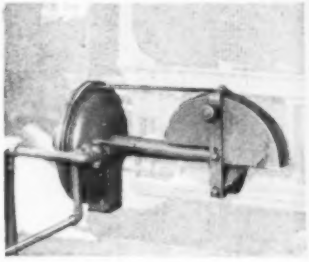

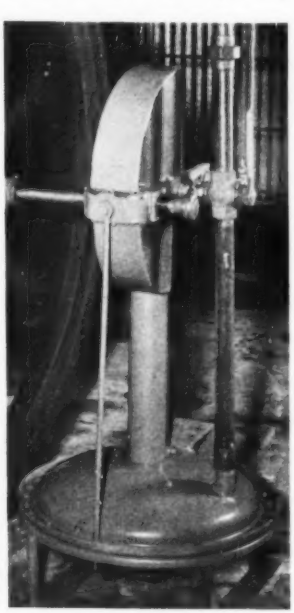

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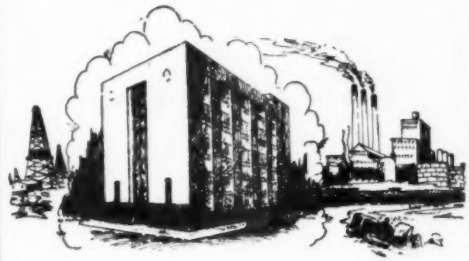

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Water plant.—Water supply for the plant is provided by two artificial lakes with a combined capacity of 4,000,000 bbl. The surface drainage usually affords sufficient water for plant supply. During dry weather three gasoline-engine-driven pumps, capable of delivering 4,500 g.p.m., augment the plant water supply.

The water for boiler and cooling tower consumption is treated by a lime-soda cold-process water treater capable of treating 2,500 g.p.m.

Cooling towers.—There are three cooling towers in operation in the plant. The 10-cell induced-draft tower handles about 17,000 g.p.m. of cooling water. There is a smaller two-cell induced-draft tower with water circulating at 9,000 g.p.m. The jacket-water cooling tower at the pressure maintenance plant is a natural-draft tower having a circulation rate of 12,000 g.p.m. The makeup water for these towers is treated by the cold-process lime-soda softener. The make-up rate is about 800 g.p.m. Chlorine is used for algae control. Sulfuric acid is fed to the towers by an automatic pH controller.

Laboratory.—The laboratory at the plant was built in 1946. It is divided into four main sections consisting of an inorganic analytical section, a low-temperature fractional-distillation laboratory, a distillation laboratory, and a vapor-pressure laboratory.

The low-temperature fractional distillation laboratory is used for determining hydrocarbon components of inlet and residue gases and for determining purity of L.P.G. products.

Salt-water removal unit.—About 4,000 bbl. per day of salt water is removed from the crude oil before stabilization. The 500 and 150-psi. horizontal separators are equipped with water withdrawal "legs" and the salt water flows to the disposal pit. An "emulsion breaker" chemical is added to the crude oil flowing from the field separator stations at about 700 yd. upstream from the 150-psi. separator inlet. Additional chemical is added to the oil stream as it enters the crude-oil contactor. A small amount of water is withdrawn in the bottom of the contactor and also a small amount is discharged from the 5,000-bbl. crude stabilizer charge tank.

With the addition of the secondary still overhead production to the crude the viscosity of the fluid is greatly reduced thereby making the fronting of the oil less difficult. This method of desalting has proven very satisfactory with the salt content of the charge stock remaining below 5 lb. of sodium chloride per 1,000 bbl.

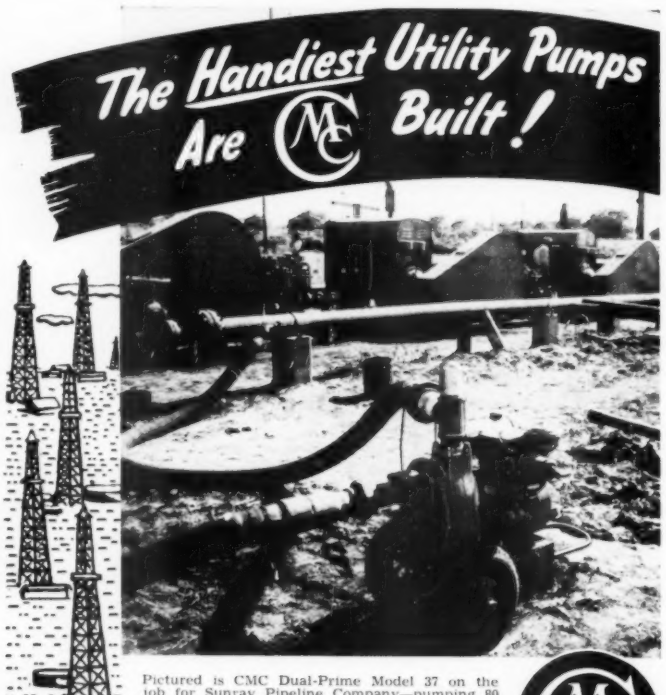
Storage and loading facilities.—The natural-gasoline storage consists of two 5,000 and one 10,000-bbl. spheres. A 5,000-bbl. sphere is used for isobutane production. Six 1,000-bbl. and four 600-bbl. tanks are used for normal butane and propane-butane mixtures. Ten 1,000-bbl. tanks were used for isopentane storage. Two 1,000-bbl. and one 600-bbl. tanks are used for the pure and blended propane production.

The products are pumped to Sweeny, located about 4 miles from the plant, for tank-car loading through three 3-in. and one 4-in. pipe lines. The blended propane is pumped via pipe line about 25 miles to the consumer.

Personnel

Key personnel of the Abercrombie company are: Ben H. Williams, vice president and manager of operations; J. P. Roetzel, treasurer; F. J. Whitley, assistant to manager of operations; C. W. Shively, chief engineer; and Hillord Hinson, chief geologist.

The supervisory personnel in Old Ocean field are Harry W. Elliott, Jr., field superintendent; C. E. Daly, drilling superintendent; R. H. Martin, construction superintendent; C. R. Burney, production superintendent; F. A. Hunter, district engineer; W. J. Hagner, Jr., plant superintendent.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Prospects Bright for Several More 1949 Discoveries in Mississippi

by J. K. Wright, Jr.

THE outlook in Mississippi for 1949 is very encouraging—Bude oil field has been discovered, LaGrange field has proved a new reservoir northeast of the field, and apparently a new field has been discovered in Greene County. Indications are that control gained from the drilling of wildcat wells over the past years is beginning to pay off and it may be expected that Mississippi should enjoy several more field discoveries before the end of 1949.

The first record of production in Mississippi was with the discovery of Amory gas field in 1926. The production from this field was of small consequence and less than 2 billion cubic feet of gas was produced before the field was abandoned. In 1930, Jackson gas field was discovered and within a period of a few years more than 200 wells had been drilled in this field, which centered in Hinds and Rankin counties. This field established the potential possibilities of Mississippi from the standpoint of future oil and gas development, and in 1932 the legislature of the state saw the need of a conservation law to protect the mineral resources of the state. The legislature of 1932 enacted Senate Bill 89, which became Chapter 117 of the Laws of Mississippi of 1932.

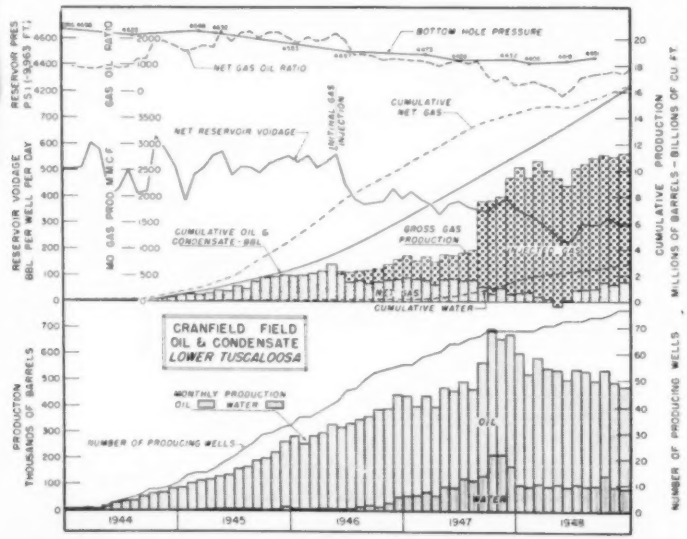
J. K. WRIGHT

H. M. MORSE

J. K. Wright, Jr., is chief engineer for the Mississippi State Oil and Gas Board, at Jackson. Born and reared in Oklahoma City, he attended University of Oklahoma and received a B.S. degree in petroleum engineering. In March 1936 he went with Phillips Petroleum Co., working in all phases of production in Oklahoma, Kansas, and New Mexico. In 1943 he became petroleum engineer for McAlester Fuel Co. in Magnolia, Ark. In January 1945 Wright accepted the position of chief engineer for the Mississippi Oil and Gas Engineering Committee located in Jackson, and since 1946 has served as director of the committee.

H. M. (Don) Morse of Jackson is supervisor and ex-officio secretary to the Mississippi Oil and Gas Board. Morse was born and spent his early youth in Mississippi, attended University of Oklahoma where he received a B.S. degree in geology, later did graduate work in geology at University of Texas. He returned to Mississippi, serving as assistant state geologist, acting state geologist, and professor of geology at University of Mississippi. In 1938 he became director of the Mississippi State Oil and Gas Board and when the new Oil and Gas Law of 1948 was passed he was reappointed by the board as supervisor and ex-officio secretary.

Under this law there was created a board, to be known as the State Oil and Gas Board, composed of the governor, the attorney general, the state land commissioner and, as a new office, a state oil and gas supervisor to be appointed by the governor for a term of 4 years, with the consent of the Senate. There were those who felt that too much was left to inference as to the powers of the board under this law and that the board would be greatly aided if a more comprehensive statute was enacted. This was felt especially since commercial oil production was discovered in the state some 7 years subsequent to the passage of the law.



Production and reservoir chart illustrating engineering work of Mississippi Oil and Gas Committee

During the 16 years the oil and gas industry operated under this law the board functioned efficiently, however diversified opinion as to the authority of the board and the rapid development of the oil and gas industry in Mississippi prevented effective board action.

In 1948, the legislature adopted House Bill 80, which was approved by the governor on April 9, 1948, and became effective 30 days after passage. The new State Oil and Gas Board is composed of five members, one appointed by the lieutenant governor for 4 years, one by the attorney general for 4 years, and three members appointed by the governor.

After passage of the new oil and gas law the following appointments were made:

Gov. Fielding L. Wright appointed W. C. Leonard, Kosciusko, 2 years;

FAILING goes to sea!

FAILING CORE DRILLS were among the first to be used in the search for oil in the Gulf Coast area. For many years they have been involved in nearly every major oil field development in South Texas and Louisiana. Now with the gradually intensifying search for new oil reserves under the waters of the Gulf of Mexico, the FAILING core drill again is being called upon to play an important part. In order to determine the required pile penetration for the large steel platforms from which many of the wells are drilled, FAILING portable rigs are being used to explore the site by means of deep core boring, shear tests on undisturbed soil samples taken from core borings and an analysis of this data with regards to the structure plan.

HERE'S THE FAILING 1500-S AT WORK on a special platform in the Gulf of Mexico, two miles beyond the mouth of the Mississippi River. This drill, owned by Greer and McClelland of Houston, Texas, is engaged in coring, preliminary to the erection of a large steel drilling platform to be used in a deep offshore test. Information gathered by this coring process is immediately passed on to the engineers in charge of the drilling program so that the big platform may be set with a minimum of delay.

IN THE OFFSHORE CORING OPERATION, a 3-inch diameter Shelby tube core barrel is used. Cores 2 feet in length, as shown above, are taken at intervals of about 10 feet, starting at the ocean floor and extending to a total penetration of from 200 to 300 feet. After the first cores are taken, the casing is advanced to the bottom of the hole. As additional cores are taken, the casing again is advanced and this procedure is continued until a firm setting is secured at a depth of from 80 to 100 feet.

IN THIS PICTURE, Roy Perkins, engineer with the Greer and McClelland firm, is testing a small section of core which has just been removed from the ocean floor. In the standard test, an axial load is slowly applied to the core at a controlled rate of strain. Simultaneous observations of the applied load and strain are made at regular intervals during the test until shearing failure occurs or until 20% strain is reached. The shearing strength or cohesion can then be computed.

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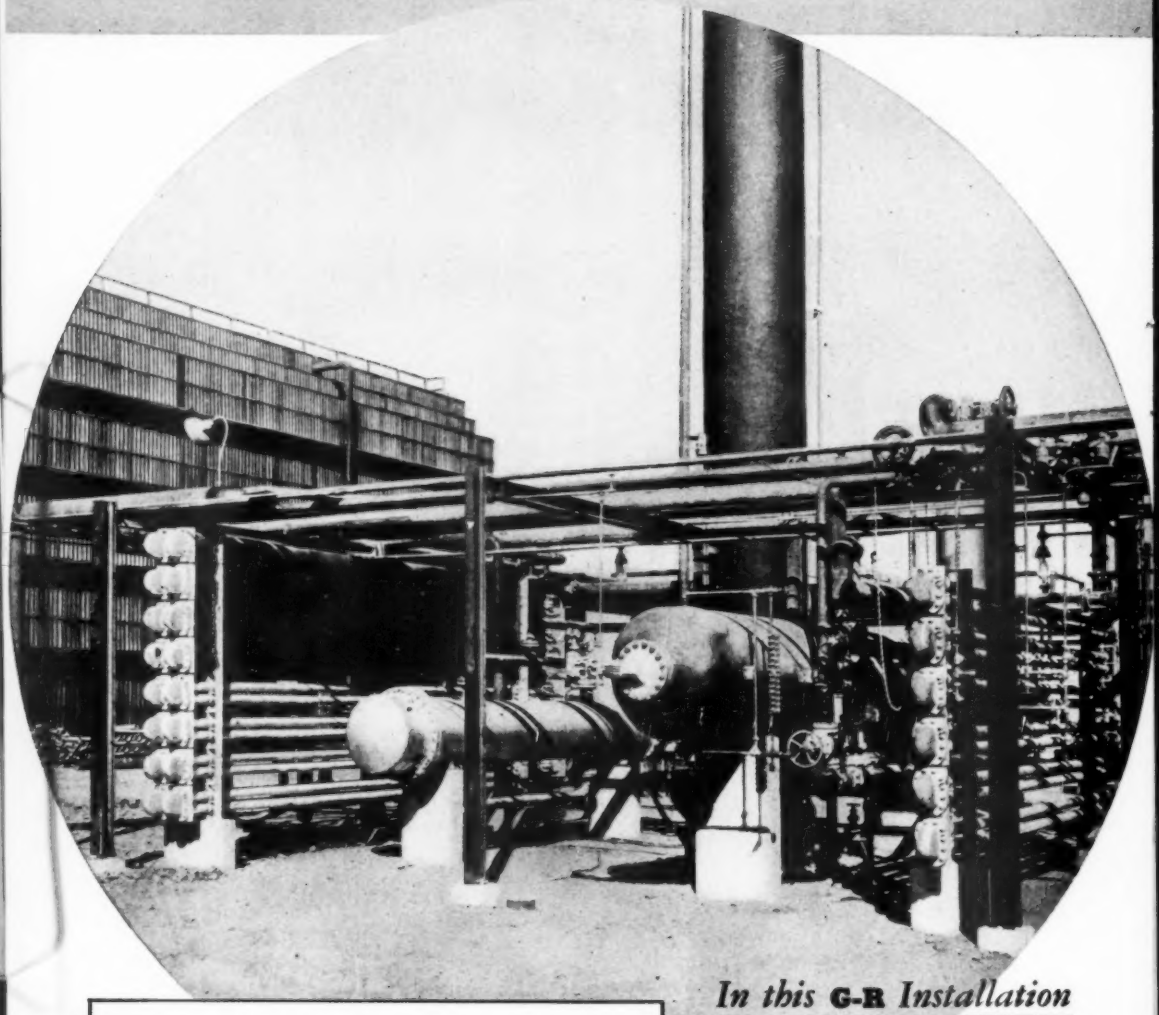
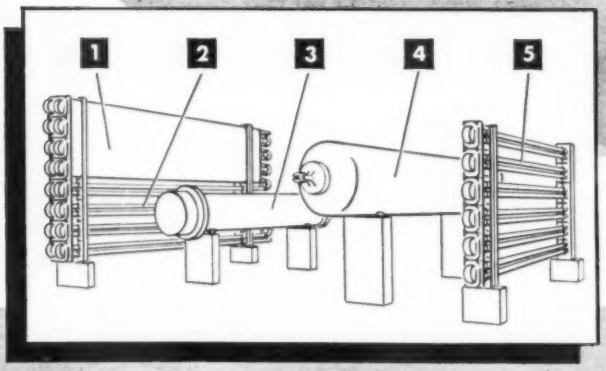


In this **G-R** *Installation*



1. 8 G-R Twin G-Fin Sections, serving as Stabilizer Exchanger
2. 8 G-R Twin G-Fin Sections, serving as Stabilizer Cooler
3. G-R Type FLT Tubular Stabilizer Condenser
4. G-R Type FSE Stabilizer Reboiler
5. 6 G-R Twin G-Fin Sections, serving as Naphtha Side-Cut Cooler

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G-R

HEAT TRANSFER APPARATUS Fully Serves a Stabilizer In This Installation

As shown in the illustration on the adjoining page, all the heat transfer apparatus required for the stabilizer at this representative refinery is of G-R design. The G-R units include cooler, exchanger, reboiler and condenser, and also naphtha side-cut cooler.

Many additional G-R units, not shown in the illustration, were also installed for other services here; for this refinery, like hundreds all over the country, standardized on G-R Heat Transfer Apparatus to assure most effective heat exchange and recovery throughout the plant.

Whatever may be *your* heat transfer requirements . . . whether standard or special . . . investigate G-R designs. The unequalled range of G-R apparatus, including both finned tube and bare tube heat transfer surfaces, provides an exactly suitable design for every service. Write for descriptive bulletins on units for services in which you are interested.

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TYPICAL DESIGNS OF G-R HEAT TRANSFER APPARATUS

G-R Tubular Exchanger, available with many different designs of stationary and floating heads, and with exclusive service features

Sectional drawing of the G-R Twin G-Fin Section, the heat exchanger with a greater range of applications than any other design on the market

One of the designs of G-R Reboiler, available with bare tubes or K-Fin elements.

GRISCOM-RUSSELL

GR-208

Hugh L. White, Columbia, 4 years; James McClure, Jr., Sardis, 6 years.

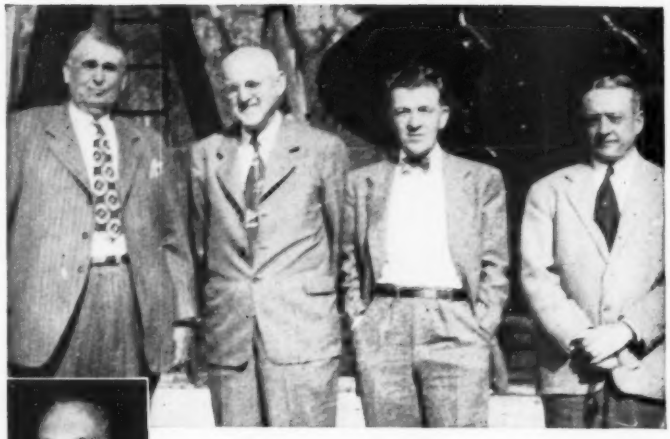
Lt. Gov. Sam Lumpkin appointed Walter G. Johnson, Jr., Jackson, 4 years; and Atty. Gen. Greek L. Rice appointed W. H. Maynard, Clarksdale, 4 years.

In the first meeting of the board, held in Jackson, on May 11, 1948, McClure was elected chairman, and Leonard vice chairman. H. M. Morse was appointed supervisor and ex-officio secretary of the board.

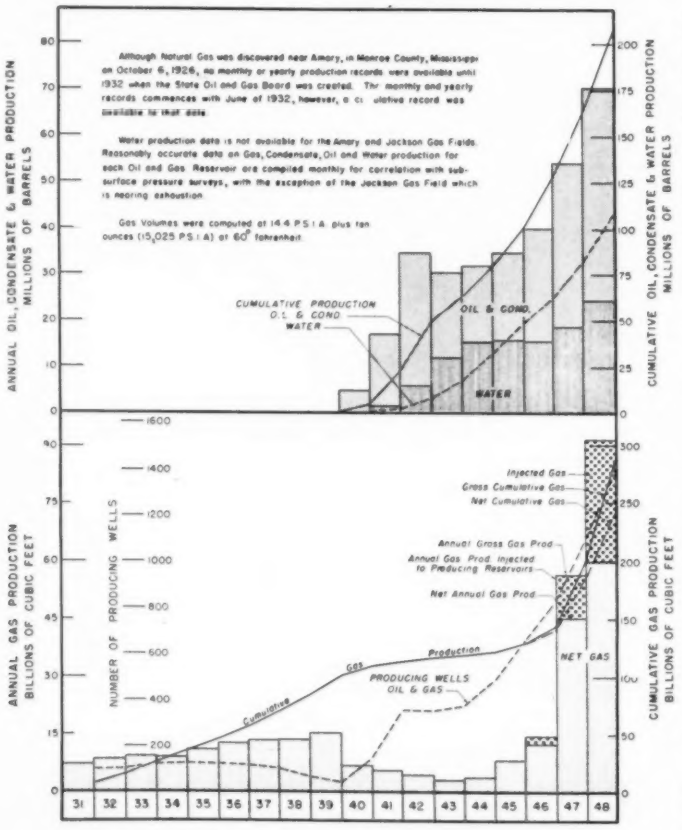
The supervisor, with the approval of the board, employs all necessary personnel. The attorney general is counsel for the board; however, special attorneys may be employed in emergencies. John E. Stone, assistant attorney general, presently serves as attorney for the board.

The board has established its rules of procedure for hearings and has adopted field rules of statewide application. Special field rules have been adopted for the Bude, Gwinville, Heidelberg, and Tinsley fields.

The policy of the law is to encourage and promote production of petroleum natural resources, to protect public and private interests against waste, to safeguard and enforce coequal and correlative rights of owners in a common source of oil and gas, and to obtain full development of resources as soon as practicable without waste. Allocation of production is to be based on the maximum efficient rate of production without causing waste. The law is comprehensive and confers jurisdiction upon the board to put into practice and enforce the act and all other things relating to the conservation of oil and gas.



Members of Mississippi State Oil and Gas Board pictured during recent tour of the state's fields: Former Gov. Hugh L. White, lumberman from Columbia; W. C. Leonard, board vice chairman and business man of Kosciusko; W. H. Maynard, attorney of Clarksdale; James S. McClure, board chairman and attorney of Sardis. Inset is Walter G. Johnson, Jr., newspaper publisher of Jackson


ANNUAL OIL, CONDENSATE & WATER PRODUCTION MILLIONS OF BARRELS
CUMULATIVE OIL, CONDENSATE & WATER PRODUCTION MILLIONS OF BARRELS
Although Natural Gas was discovered near Amory, in Monroe County, Mississippi on October 6, 1926, no monthly or yearly production records were available until 1932 when the State Oil and Gas Board was created. The monthly and yearly records commences with June of 1932, however, a cumulative record was available to that date.
Water production data is not available for the Amory and Jackson Gas Fields. Reasonably accurate data on Gas, Condensate, Oil and Water production for each Oil and Gas Reservoir are compiled monthly for correlation with subsurface pressure surveys, with the exception of the Jackson Gas Field which is nearing exhaustion.
Gas Volumes were computed at 14.4 P.S.I.A. plus ten ounces (15.025 P.S.I.A) at 60° fahrenheit.
CUMULATIVE PRODUCTION O. & COND.
WATER
OIL & COND.
WATER
ANNUAL GAS PRODUCTION BILLIONS OF CUBIC FEET
NUMBER OF PRODUCING WELLS
CUMULATIVE GAS PRODUCTION BILLIONS OF CUBIC FEET
Injected Gas
Gross Cumulative Gas
Net Cumulative Gas
Annual Gross Gas Prod.
Annual Gas Prod. Injected to Producing Reservoirs
Net Annual Gas Prod.
Cumulative
GAS
Production
PRODUCING WELLS OIL & GAS
NET GAS
31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Basic production chart on oil and gas reservoirs of Mississippi

Effective April 1, 1949, the physical activities of the Mississippi Oil and Gas Engineering Committee were revived and the author, together with his staff, were employed by the Mississippi State Oil and Gas Board. In this new capacity, as chief engineer, he will head the technical and statistical work of the board.

Production and Severance Taxes

The 1948 legislature also adopted Senate Bill 574, which allows for a tax on oil and gas produced in Mississippi for the purpose of paying the expenses of the State Oil and Gas Board. This bill gives the board power to set the assessment for board expenses, not to exceed 2 mills on each barrel of oil and one-tenth mill on each 1,000 cu. ft. of gas produced in Mississippi. This assessment may be changed from time to time as the board deems advisable.

The 1944 legislature adopted House Bill 23, which was approved on February 29, 1944, and made effective March 1, 1944. This law was the oil severance tax which levied an assessment on oil or condensate production in the amount of 6 cents per barrel, or 6 per cent of the value thereof at the point of production, whichever

Flexible-type handles shown above, available as alternate equipment

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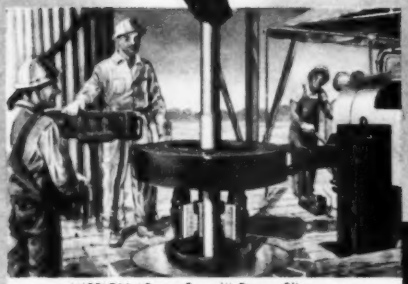

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G 292 B

was the greater. Also there was a severance tax of 2½ per cent of the value of natural gas produced. However, the 1948 legislature raised the severance tax rate on gas to 6 per cent of the value or 3 mills per 1,000 cu. ft. based on 15.025 psia.

First Well in 1903

The first active drilling for oil or gas in Mississippi occurred shortly after the turn of the twentieth century. Perhaps the first well drilled in Mississippi in search of oil or gas was the Alabama-Mississippi Investment & Development Co.'s well, located a short distance east of the town of Enterprise, Clark County. This well was drilled in 1903 and was abandoned at a depth of 1,842 ft.

For the next 18 years the wildcat activity in the state was rather meager and it was not until 1921 that a well was drilled below the depth of 4,000 ft. This well was Preston Oil Co. 1 McLean, drilled near Winona, Montgomery County, to a depth of 4,260 ft. and abandoned June 21, 1921, as a dry hole.

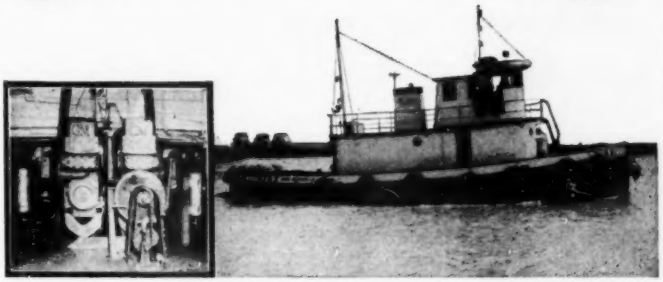
Wildcat drilling in the state continued spasmodically with a maximum of 31 wildcat wells being drilled in any one year prior to the discovery of Tinsley oil field in 1939. During this interval Amory gas field, near the city of Amory in Monroe County, was discovered with the completion of the Amory Petroleum Co. 1 Carter on October 6, 1926, from a total depth of 2,412 ft. Following the completion of the discovery well, several wells were drilled in the immediate area with only three being completed as commercial producers. Gas production from Amory field was used to supply the nearby towns of Tupelo, Amory, and Aberdeen for several years but, by the end of 1937, the field was no longer capable of delivering gas commercially to the pipe line serving the towns mentioned and the field was abandoned after having a reported cumulative production of 1,717,109 M.c.f. of dry gas. The producing horizon was a hard sandstone in the upper Mississippian rocks of Paleozoic age.

Subsequent to the publication of a bulletin in July 1916 by the United States Geological Survey entitled "Structure of the Vicksburg-Jackson Area," a leasing campaign was started by a number of oil and gas companies and a good many wells were drilled in the vicinity of Jackson. In 1917 and 1918 two wells were drilled on the north flank of the Jackson structure which reached the present gas-production formation; however, they were structurally low. In December 1929, Jackson Oil & Gas Co. started a well which was completed in the early part of 1930 to establish the first commercial gas production from Jackson gas field. Since that time more than 150 wells have been completed as producers on the Jackson dome.

Early in 1929 Lauderdale Oil & Gas Co. drilled a well a few miles north of Meridian, which had several oil shows in the Tuscaloosa formation. During this time there was considerable surface geology work being carried on by various companies and operators in this area. In 1930 Gulf Refining Co. mapped a closed fault structure in the vicinity of Quitman and during 1931 drilled two wells on this structure. Oil shows of sufficient importance were obtained to justify the setting of casing on the second well drilled, and testing showed the well to be productive of heavy oil and salt water. However, the well was not commercial.

During the period from 1929 through 1936 various operators engaged in exploratory drilling throughout counties located in central and southern Mississippi. During the fall of 1934 Hix & Germany drilled a well in Lamar county into the Wilcox formation and abandoned it. It was generally recognized that this well was structurally high on top of the Wilcox and, subsequent to seismograph and core-drill work in this immediate area, Sun Oil Co. drilled its 1 Scanlan and Semmes well approximately 1 mile south of the Hix & Germany well. This well encountered domal material at a depth of 1,642 ft. and topped salt at 2,522 ft. The well became the discovery well of the Midway dome—the first salt

GM Diesel Powered



Pictured above is the AJAX, small as tugs go, yet capable of delivering better than 300 usable horsepower to a 52" diameter by 46" propeller at around 350 turns per minute. That's a lot of power for a fifty-five footer, but thanks to modern engine design and a twin 71 G.M. Diesel, furnished by GEORGE ENGINE COMPANY of New Orleans, it has been accomplished. Such a power plant easily delivers a speed of 11 miles per hour, running light, according to her owners, Guidry and Savoie of Cut Off, Louisiana. Captain Richoux believes that the AJAX has the power to tow three 6 or 7 thousand barrel barges in the Intracoastal Canal. The tug has quick acceleration and spins on a dime with very little heel.

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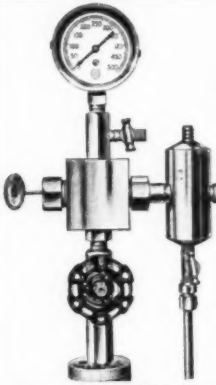

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dome discovered in the state of Mississippi.

The year 1928 was the beginning of concentrated geophysical surveys in the state. Detailed magnetic surveys were carried on by several companies and the possible existence of an extensive salt-basin dome underlying south central Mississippi was determined by reflection and refraction-seismograph work, gravity-meter work, and other methods of geophysical exploration.

The year 1939 marks the inception of the state's first commercial oil field. In a memorandum for the press under date of April 12, 1939, the Mississippi State Geological Survey announced that a structural high had been worked out in Yazoo County. Following this publication a number of companies and operators, who had not already done so, began an active leasing program in the area and, before the end of the year, the discovery well had been drilled and completed. Union Producing Co. with the completion of its 1 G. C. Woodruff well had the distinction of obtaining the first commercial oil production in the state, as well as discovering prolific Tinsley oil field.

Discovery of oil in Yazoo County started a great leasing and drilling campaign that has continued until the present time. Within 6 months after the discovery of Tinsley field, Kingwood Oil Co. with the drilling of its 1 Wilburn well opened production in Pickens field of Yazoo and Madison counties. During the summer of 1941 British-American Oil Co. discovered Cary oil field of Sharkey County. This latter field was never prominent from a productive standpoint and was later abandoned.

While geophysical exploration continued at a high rate, oil and gas discoveries followed closely those of the Gulf Coast region in that there was a lapse of a few years prior to another series of field discoveries. During this period the salt-basin area of central and southern Mississippi received much prominence from the standpoint of all types of geophysical work and drilling established the presence of approximately 11 salt domes prior to 1943. Over this period of years from 1939 to 1943 appreciable gravity-meter work had been completed and there was present a large gravity minimum over the Gwinville area of Jefferson Davis County. In 1940 a well was drilled on a location, which has now been proven to be the approximate northwest limits of development in Gwinville field, to a depth of approximately 8,500 ft. without commercial shows.

The year 1943 was the beginning of a series of discoveries of oil and/or gas-producing fields throughout the salt-basin area. In March 1943 The California Co. established production from the Massive sand zone of the lower Tuscaloosa formation with the completion of its 1 G. T. Smith well to open production in Brookhaven field. This well obtained the first Massive sand production in the state and opened the possibilities of production from a new geological province.

In 1943 and 1944, the following fields were discovered in the state: Eucutta, Flora, Cranfield, Heidelberg, Gwinville, Mallalieu, Baxterville, Bruinsburg, and Langsdale. The years 1945 and 1946 marked discovery of Carthage Point, SoSo, Hub, Fayette, Quitman, LaGrange, Kings, and Pine Ridge, while other important producing horizons and extensions in the already established fields were being developed.

In 1946 Mississippi's deepest test was drilled by Superior Oil Co. southwest of Hattiesburg in Forest County. This well was carried to a depth of 15,730 ft. and though every effort was made to obtain a satisfactory completion in the Lower Cretaceous horizon, the well was not completed as a commercial producer. The California Co. and Humble Oil & Refining Co. did, however, obtain Lower Cretaceous production in Cranfield and Hub fields that stimulated interest to a considerable extent on prospects that have been drilled to test only the Massive Tuscaloosa formations.

The year 1947 saw the greatest number of wells drilled in the state for any one year. There were a total of 93 wildcat and 390 field wells drilled, making a grand total of 483

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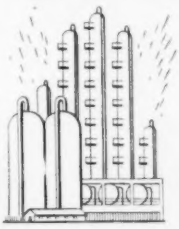

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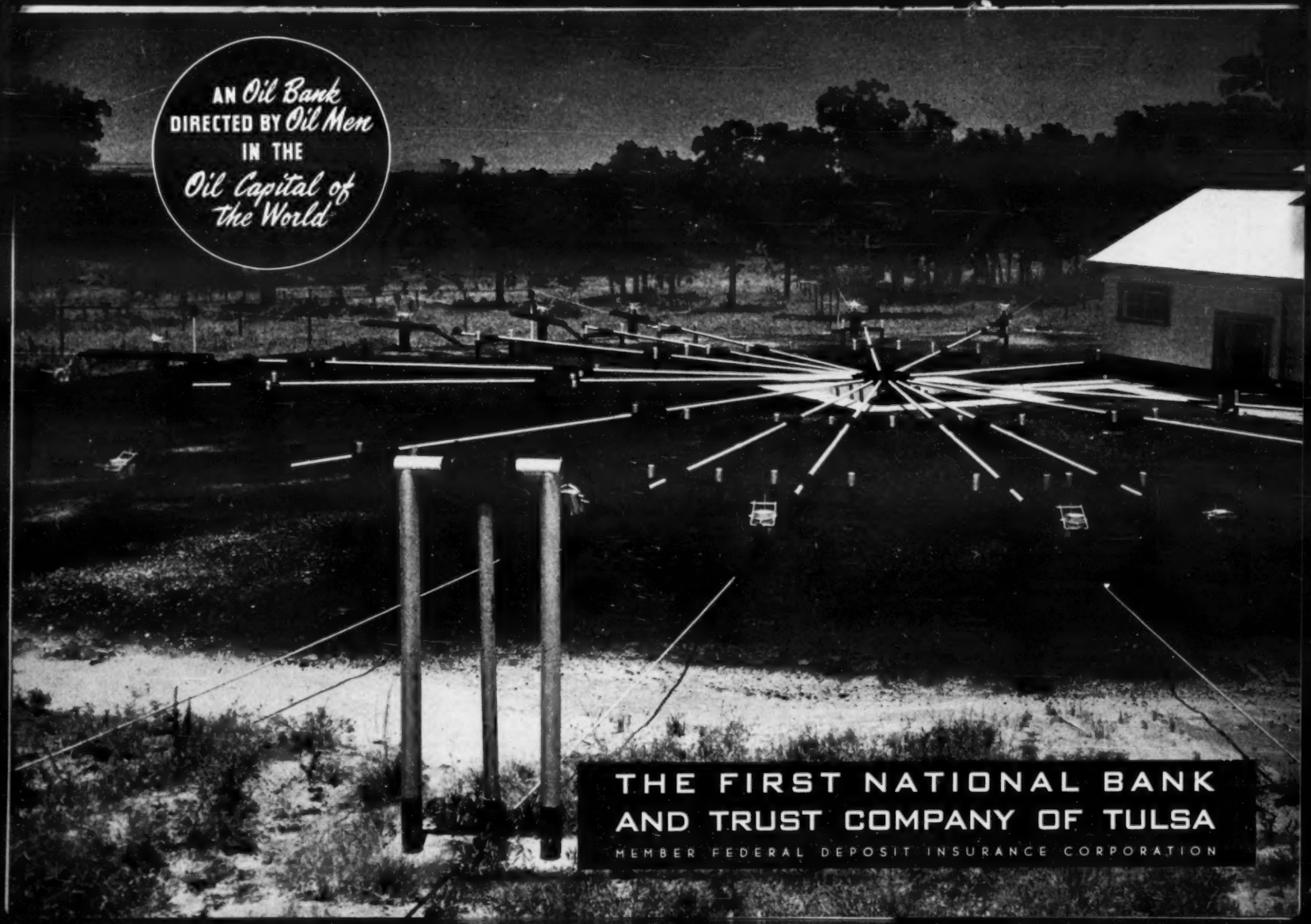
wells completed. During this year McBride, Sandersville, Oldenburg, and Yellow Creek fields were discovered. As the year ended Gulf Refining Co. had definitely established Lower Cretaceous oil production in Ovett field of Jones County, however, the discovery well of this field was not officially completed until 1948. Five additional salt domes were also discovered.

From a drilling standpoint the extension activities of Baxterville, Brookhaven, and Mallalieu fields, together with the rapid development of Wilcox oil production in LaGrange field accounted mainly for continued rise in production. Oil or gas production from the newly discovered fields during the year was of little significance. McBride sour gas field has been closed in since its discovery; Sandersville field produced a total of 882 bbl. of oil from two wells over a period of 2 months before the field was officialy abandoned; and the discovery wells of Oldenburg and of Yellow Creek fields were completed so close to the end of the year that their total production for the year 1947 was small.

During the fall of the year the Cranfield Unit gas-cycling plant was put into operation. The Cranfield plant gathers the gas produced from both oil and condensate wells in Cranfield field, processes the gas for liquid hydrocarbons and reinjects this gas into the gas cap of the lower Tuscaloosa reservoir. It was not until early 1947 that gas production from the field through the gas-transmission system of United Gas Pipe Line Co. and Southern Natural Gas Co. became continuous.

In 1948, over 45,500,000 bbl. of oil and condensate were produced in the state. This was not only the greatest amount produced in any single year but reflects an increase of approximately 9,500,000 bbl. over 1947. There were 426 wells drilled, 316 of which were field wells and 110 of which were wildcat wells. Of the wildcat wells drilled, five were productive and resulted in the discoveries of the following fields: LaGrange-South in Adams County, Roxie in Franklin County, Ovett in Jones County, Sandy Hook in Marion County, and East Yellow Creek in Wayne County. Fifty-seven of the field wells were dry holes. Drilling also proved the presence of the following salt domes: Kola in Covington County, County Line in Greene County, McLaurin in Forrest County, and Vicksburg in Warren County, making a total of 41 proven salt domes in the state at the present time.

At this time there are two producing fields which have been unitized and are under pressure maintenance. The Cranfield field was unitized and started large-scale gas injection during the fall of 1947 while Brookhaven field was unitized effective June 1, 1948, and started gas injection immediately thereafter.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PERMANENT: There's no need to make any further repairs – the Hycar pad and clamp is resistant to deterioration by water, gas, oil, etc. – whole unit will actually outlast the pipe.

HIGHLY ECONOMICAL: The Patchmaster is an inexpensive permanent repair or it can be used and reused, saving you money either way.

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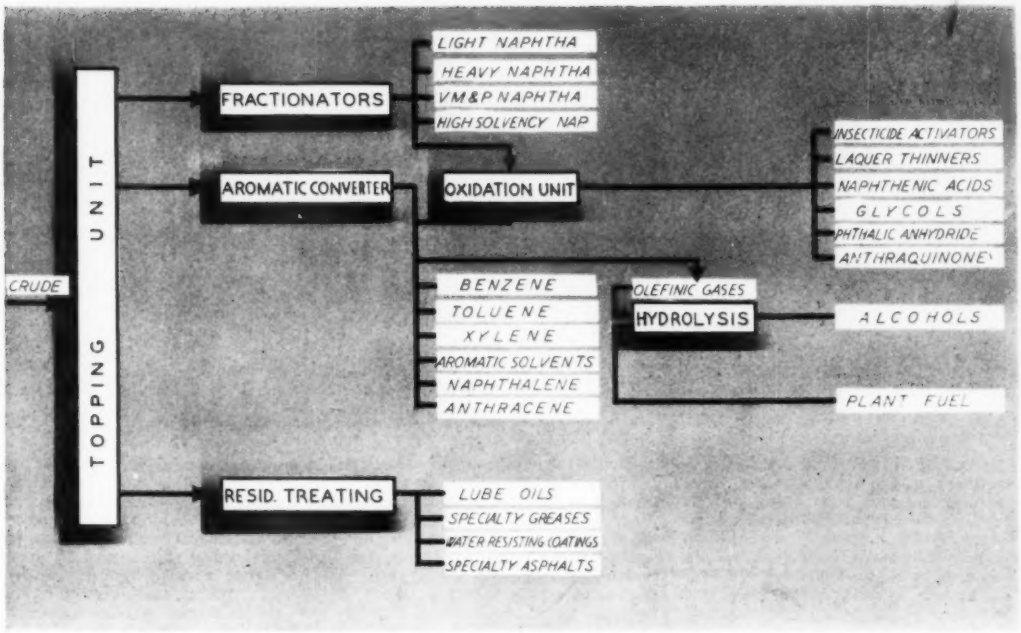


Block flow diagram illustrating operations and principal products for new petrochemical plant at Stanton Chemicals, Inc., at Corpus Christi

New Plant Converts Crude Petroleum Oils for Chemical Manufacturing Purposes

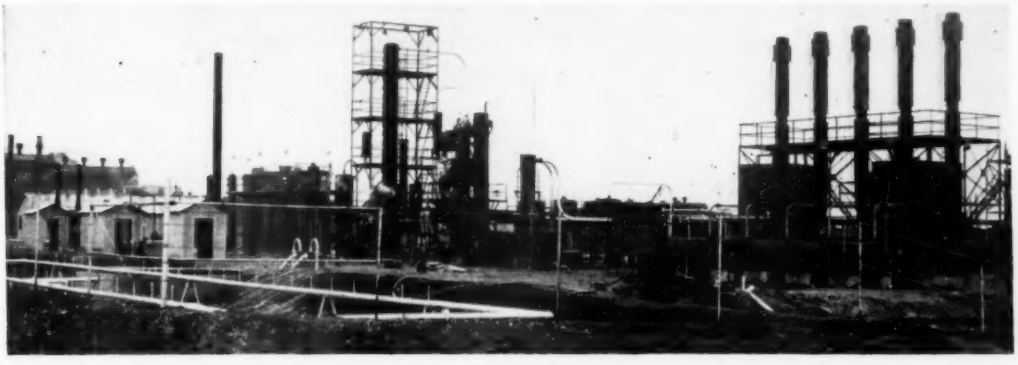
Employs Conventional Refinery Methods

by T. H. Bean* and A. L. Vener†

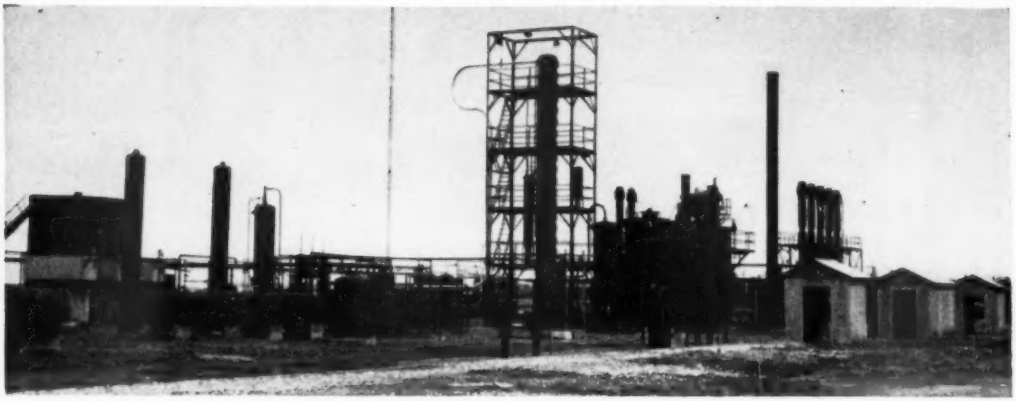
THE new plant of Stanton Chemicals, Inc., now nearing completion at Corpus Christi, Tex., has the distinction of being one of the first plants in the United States to completely convert crude petroleum oils for chemical-manufacturing purposes and to employ conventional refinery methods for processing only certain portions of the charge stocks which are more valuable as refined petroleum products and specialties.

The manufacture of organic chemicals from petroleum hydrocarbons has been practiced to a limited ex-

*Manager of manufacturing, and †process engineer, Stanton Chemicals, Inc., Corpus Christi, Tex.



General view of refractionator battery, aromatic converter unit, and spray pond (foreground, not filled)



Photograph showing general view of topping unit and heavy-oils treating section

tent as an adjunct to conventional oil-refinery operations for many years. A large number of chemical-byproduct plants have been operated successfully by major oil companies for the profitable utilization of various refinery wastes, including cracking-still gases, treating-plant sludges, and residues rejected by solvent-extraction processes.

Raw Materials From South Texas Fields

Petroleum oils and kindred products from South Texas fields will be utilized for the production of benzene, toluene, organic solvents, anthracene, naphthalene, phthalic anhydride, naphthenic acids, alcohols, glycols, resins, bituminous asphalts, and lubricating specialties. Special organic chemicals and lubricants will be manufactured to consumer specifications.

The economics of such operations are presently justified in view of the strong market and short supply of benzene, naphthalene, and associated products. For many years, the coal-tar industry has been the principal source of most of these compounds.

Outstanding features of the plant are its flexibility and versatility of operation, incorporated in the original plant design. Several complete production units, including (1) topping, (2) aromatic conversion, (3) tar fractionators, (4) residuum processing, (5) aromatic distillate fractionators, (6) solvent fractionators, (7) alcohol plant, (8) light and heavy-oil treating, (9) oxidation, and (10) lubricating specialty plant comprise the fully integrated system of operations.

The flexible arrangement of the various plant processes allows the plant to quickly adjust its operations to current market trends. Semifinished petroleum products, such as gas oil, residuum, naphtha, etc., can be obtained from local sources of supply as required to supplement production from plant units.

Plant operation. — The simplified flow diagram, illustrates some of the more important phases of the operations conducted by Stanton for the production of organic chemicals and related materials from crude oil.

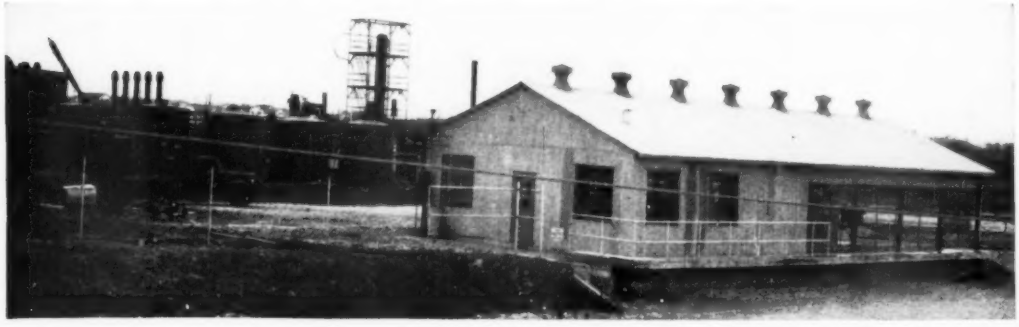
In the topping unit the crude oil is charged to a gas-fired heater where the outlet temperature of the oil is sufficient to vaporize substantially all components except the heavy residual portion. The volatile portions of the crude oil are vaporized in a conventional flash tower and separated by means of fractionation from the residuum. An overhead naphtha, light naphtha, and heavy naphtha fractionation is effected, leaving the gas oil in the bottom of the topping tower. The latter product is used as feed stock for the aromatic converter unit. Overhead naphtha reflux is used for temperature control within the topping tower. The raw naphtha side streams are cooled and given a conventional doctor sweetening for the removal of mercaptan sulfur before further processing.

Chemical treatment is continuous and consists of mixing the raw naphtha with a sodium plumbite solution, followed by reactions in a sulfur drum, and final caustic wash. The sweetened naphthas are pumped to storage, blended, and used as feed to the heavy naphtha refractionators.

The aromatic conversion unit is used to rearrange the structure of the straight-chain olefins and paraffins into naphthenes and aromatic hydrocarbons.

Gas oil from the topping unit is continuously recycled through a gas-fired preheater to attain a temperature sufficient to cause vaporization of the charge in the flash chamber.

Lubricating-grease plant and battery of finished-product storage tanks



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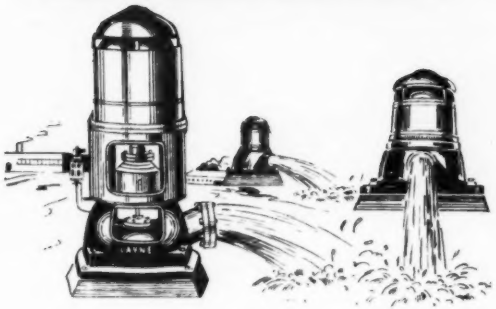

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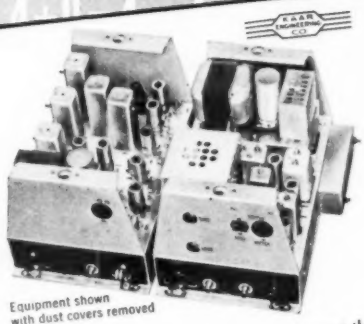

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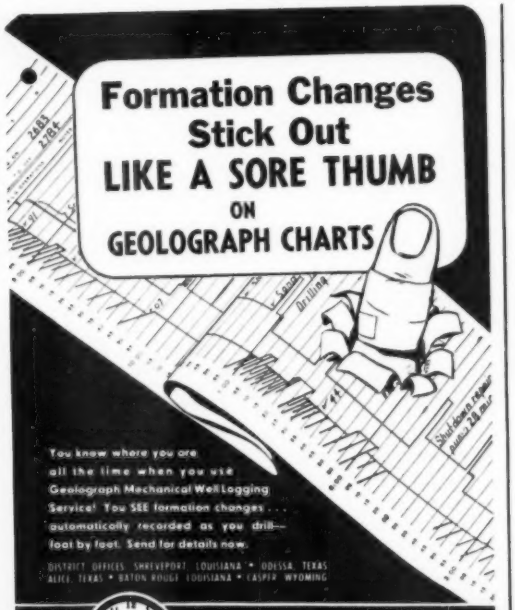

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Vapors entering the converter are given additional heating in the presence of a catalyst. Carefully controlled conditions of temperature and pressure are necessary to bring about the desired reactions. Cyclic compounds present in the vapor stream leaving the converter are condensed and fed to the aromatic distillate refractionators. The fixed gases are passed through dehydrator towers for removal of entrained moisture and the olefinic portions subsequently are used in the manufacture of alcohols and oxygenated compounds.

Propylene present in the organic vapors from the aromatic conversion unit is utilized to produce a commercial-grade alcohol mixture of n-propyl and isopropyl alcohols.

Concentrated sulfuric acid passed countercurrent to the organic vapors under accurately controlled conditions selectively reacts with proylene and removes it from the vapor stream as an alkyl sulfate complex. The reaction is carried out in an acidproof ceramic tower packed with carbon Raschig rings. The reacted propylene sulfate carried in the acid stream is transferred to a hydrolizer where it is mixed with steam to form n-propyl and isopropyl alcohols.

The heat of reaction combined with the heat supplied by the hydrolysis steam is sufficient to cause the vaporization of alcohol formed in the reaction within a stainless-steel stripping column. Vapors leaving the stripper are passed into a neutralizer to remove entrained acid. Final distillation to remove ethers and to bring the alcohols up to specification is made in an alcohol still provided with a steam reboiler.

Two batteries of continuous reboilers and fractionating towers are contained in the refractionator area.

Individual stills connected in series and fired by low-pressure steam, high-pressure steam, and circulated hot oil, respectively, are used for the fractionation of the aromatic distillate into narrow-boiling fractions of benzene, toluene, xylene, and mixed heavy aromatics.

The bottoms from the last stage aromatic fractionator are fed to gas-fired tar stills. Naphthalene, anthracene, and phenathrene are separated from the aromatic tars in a heavy distillate fraction which is condensed and allowed to crystallize. The residual heavy pitch is cooled and pumped to storage.

Treated naphthas from the topping unit are transferred into one battery of the continuous stills, which is heated by circulated hot oil, and are accurately fractionated to meet narrow-boiling-point specifications. The bottoms from the naphtha refractionators are a heavy distillate product used for charge stock to the oxidation unit.

Mixed naphtha stock from the naphtha refractionators is charged to vaporizers heated by circulated hot oil. The naphtha vapors are transferred into a flash drum and are distributed through a series of catalyst beds, where they are caused to combine with atmospheric oxygen. The unreacted vapors, from the catalyst beds, are charged to a reaction vessel for further oxidation and the reaction products are contacted with an alkaline wash.

Precipitated naphthanate, salts, aldehyde condensation products, etc., are decanted from the solution and fed to filter presses. The filter cake is washed and treated with mineral acids for the formation of organic acids.

The residuum from the crude-topping operations is given further treatment for the removal of asphalts and the asphalt-free base is additionally refined and used for the manufacture of specialty oils and lubricating greases. Asphalts are utilized for the manufacture of water-resistant coatings and technical preparations of a proprietary nature.

The solid oils compounding plant is equipped to manufacture all types of greases and specialty lubricants according to customer requirements.

Modern continuous-type equipment makes possible uniform products in a minimum floor space.

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selected over other available tracts in this area on the basis of existing water, railroad and truck transportation, utility service, fire protection, and availability of land for future expansion. City water, gas, and electric companies make available large quantities of dependable utilities without expensive initial installation costs. Frontage has been secured on the recently extended Nueces Bay ship channel which will afford deep-water transportation facilities. Two all-weather highways and extensive railroad connections adjoin the plant area, assuring excellent transportation for products and raw materials.

Plant facilities.—Plant offices, laboratory, wash rooms, utility, and solid-oils compounding plant are housed in standard sectional-type steel buildings at the entrance to the plant grounds.

A modern, well-equipped research and control laboratory adjacent to the main office building is maintained to provide continuous development and control over all phases of the plant production.

A wash-room with locker and shower facilities is provided for plant operators and office personnel. Included in the utility building are the warehouse, machine shop, electric power plant, and boiler-plant installations.

Electric power for the operation of equipment in the process area is generated by three Westinghouse 220-volt, 3-phase, 4-wire, synchronous generators driven by heavy-duty gas engines. Standby power is obtained from a local utility company. A battery of Broderick gas-fired locomotive-type boilers furnishes steam for process and utility heating. Boiler-feed water from city mains is zeolite treated before entering two 3¼ by 4¼ National Transit feed-water pumps. Plant air is supplied by a single-stage, reciprocating air compressor.

A unique feature of the plant is the use of ground water for a large portion of the process cooling-water load. A large reservoir is formed by open excavation and the water level is maintained by ground seepage from nearby Nueces Bay. This supply is used only where corrosion and fouling factors are not controlling in the design of heat-transfer equipment. Water is pumped to cooling units by centrifugal pumps equipped with floating suction inlets which are used to reduce the amount of silt and trash picked up from the open pond. Twin-type strainers remove particles that might damage the pump or cause stoppages in the supply lines.

The spray-type cooling pond for treated water is lined with an asphaltic membrane and supplies additional cooling capacity for critical plant uses. Makeup for the treated-water system is from city water mains.

A burning stack is provided for the disposal of all combustible gases from the pressure relief system which serves the entire plant. A water seal is built into the base of the structure to prevent explosions of gases within the blowdown gathering system.

Plant layout.—A simple well-ordered arrangement of equipment and buildings has been followed to insure easy access to all units. The tract is divided into administrative, control, storage, and process zones. The process zone is planned in a manner that allows each operating unit to be contained within definite plot limits so that any future expansion or alteration can be made without any interruption to adjacent operations. A neat, simple grouping of units is obtained by uniformly spacing main areas within limit lines.

Natural gas, city water, high-pressure and exhaust steam, air, and circulating process water supply are carried below ground level in an open concrete utility trench extending across the entire process zone. Product lines connecting with the storage zone are carried overhead on structural-steel supports at the rear of the process zone.

Electric-power distribution is underground through waterproof conduits. Each process unit is provided with a manhole for easy access to dis-

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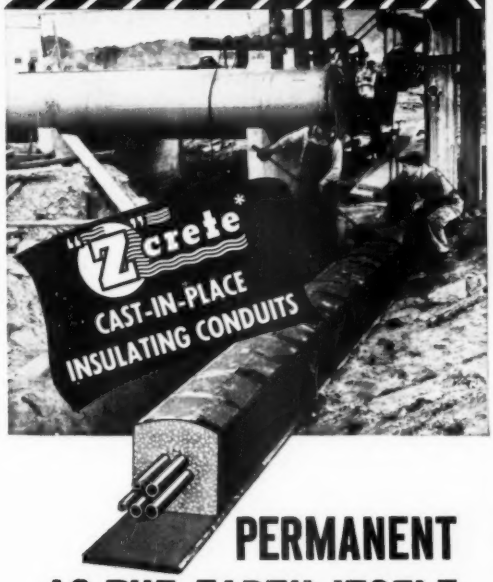

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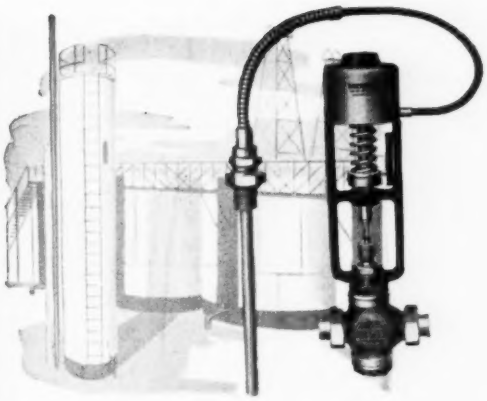

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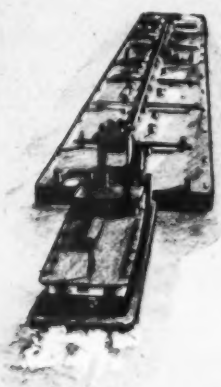

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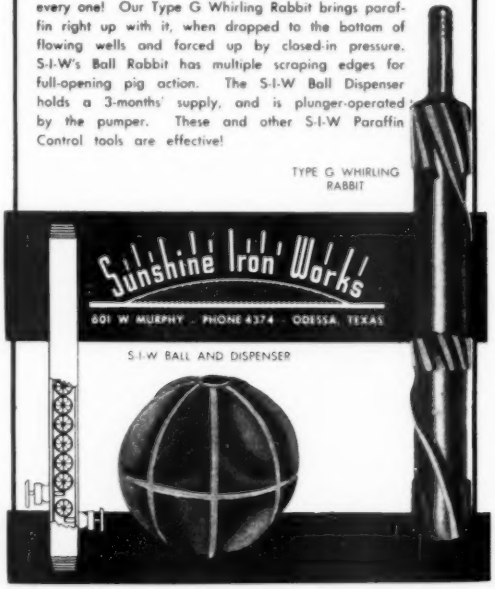

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connect switches and automatic contactors.

The utility trench extending across the front of the process zone divides that section from the control zone. A roadway extending across the rear of the process zone provides access for heavy maintenance equipment to all units and serves as a fire protection barrier to separate the tank farm from the process units.

Control.—Separate control buildings are provided for each of the major process units. These are of standard sheet-metal sectional construction with a large glass window overlooking the adjacent operating unit. Indicating and recording controllers are mounted on steel panels along the rear wall of each building. Removable sections of the outside building walls allow quick access to the control instruments for adjustment and repair.

Pressure gages, Brown indicating controllers, flow meters, and thermometers are used on all flow lines to provide an accurate visualization and regulation of all operating variables, resulting in uniformity of product. Leeds & Northrup automatic potentiometer pyrometers are installed throughout the plant for temperature recording and control.

Standard A.P.I. specification steel tanks provide storage capacity for crude, gas-oil, aromatic fractions, tars, naphthas, and lube oils. The tank farm is divided into three sections, each of which is manifolded so that each group may be used in any of several combinations for the blending of products and feeds to production units. Fire walls for individual tanks are in accordance with A.P.I. recommendations.

Fire protection.—High-pressure steam and water outlets equipped with chemical foam dispensers are located at strategic points throughout the manufacturing area. Portable carbon dioxide and Du-gas units are placed at convenient locations.

New Offshore Gas Field Discovery

A NEW gas field has been opened in the Gulf of Mexico southwest of Marsh Island (18 miles off the coast of Vermilion Parish) by Superior Oil Co. Its C-1 Gulf of Mexico in the Vermilion area Block 76 has tested at the rate of 7,587,000 cu. ft. of gas per day with a spray of condensate, 46.7° gravity. The well was drilled to a total depth of 11,603 ft. and one show encountered. Perforations were made at 7,415-30 ft. and the test developed a pressure of 2,810 psi. through a 26/64-in. choke.

Superior's gasser is the third offshore discovery reported since the first of the year. The others were California Co.'s Bay Marchand oil strike in Lafourche Parish and Humble Oil & Refining Co.'s oil well in the South Timbalier Island area, Terrebonne Parish.

This is Superior's second discovery in the tidelands operations, the first—a gas and condensate well—being located about 9 miles easterly in Block 71.

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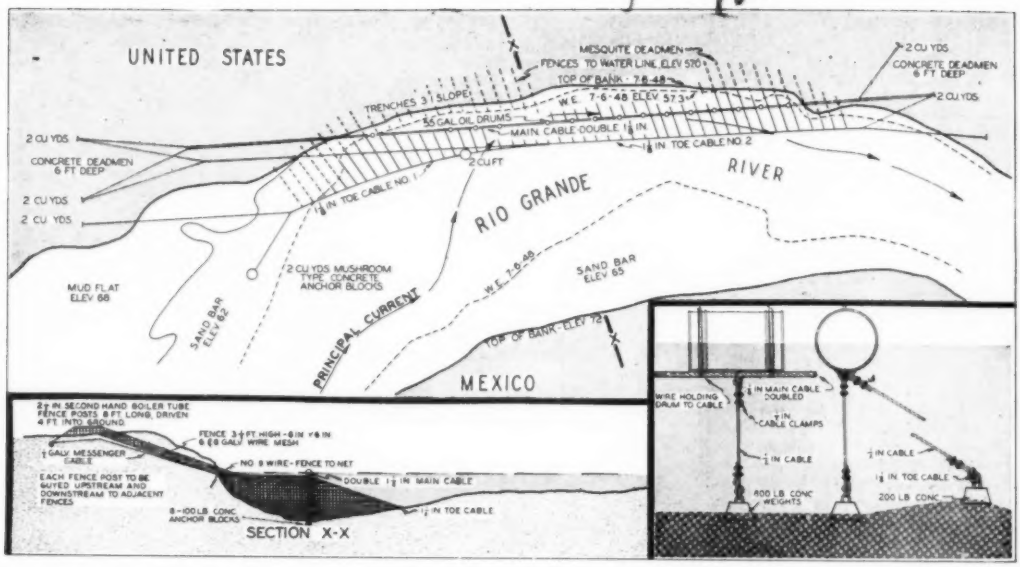
UNITED STATES
MEXICO
RIO GRANDE
RIVER
MESQUITE DEADMEN
FENCES TO WATER LINE, ELEV 570
TOP OF BANK - 7-8-48
W.E. 7-6-48 ELEV 573
TRENCHES 3:1 SLOPE
55 GAL OIL DRUMS
MAIN CABLE DOUBLE 1⅛ IN.
1⅛ IN. TOE CABLE NO. 2
1⅛ IN. TOE CABLE NO. 1
2 CU YDS
CONCRETE DEADMEN 6 FT DEEP
2 CU FT
2 CU YDS MUSHROOM TYPE CONCRETE ANCHOR BLOCKS
MUD FLAT ELEV 68
SAND BAR ELEV 62
PRINCIPAL CURRENT
W.E. 7-8-48
SAND BAR ELEV 65
TOP OF BANK ELEV 72
2½ IN SECOND HAND BOILER TUBE FENCE POSTS 8 FT. LONG, DRIVEN 4 FT. INTO GROUND
FENCE 3½ FT. HIGH - 6 IN. X 6 IN. 6 GA GALV. WIRE MESH
⅜ GALV. MESSENGER CABLE
NO. 9 WIRE - FENCE TO NET
EACH FENCE POST TO BE GUYED UPSTREAM AND DOWNSTREAM TO ADJACENT FENCES
DOUBLE 1⅛ IN. MAIN CABLE
8 - 100 LB. CONC. ANCHOR BLOCKS
½ IN. TOE CABLE
SECTION X-X
WIRE HOLDING DRUM TO CABLE
1⅛ IN. MAIN CABLE DOUBLED
7/8 IN. CABLE CLAMPS
⅞ IN. CABLE
⅞ IN. CABLE
1⅛ IN. TOE CABLE
800 LB. CONC. WEIGHTS
200 LB. CONC.

Plan, section across Rio Grande, and details of special net carrier which solved the river-encroachment problem for La Gloria Corp.

River Encroachment Halted by Revetment

by Samuel A. Story, Jr.*

Position of Rio Grande prior to spring flood of 1948. Dashed line indicates river bank position after flood (two producing wells were in area)

LA GLORIA CORP. in late 1948 was faced with the unusual problem of having to protect a producing lease from rapid river-bank erosion. River encroachment amounting to 80 to 100 ft. semiannually threatened to destroy a great part of the lease as well as two producing wells.

The lease in question is in Penitas field where gas production has been established. It is located in the southwest corner of Hidalgo County, Texas, 8 miles southwest of the town of Mission and borders on the lower banks of the Rio Grande.

The lower reaches of the Rio Grande have reached the stage of old age, characterized by a gentle gradient, a broad flood plain, a meandering course, and many changing distributary channels. The many old channels which the river has followed, locally known as "resacas," easily may be seen both on the aerial photographs and on the ground. The enormous floods occurring semiannually are a result of the melting snows and the heavy rains which fall at certain periods of the year.

The southern boundary of the La Gloria Corp. lease follows extreme meander bends in the river. The river's tendency to enlarge the meander bends by cutting inland on the lease was endangering two producing wells in Penitas field. At the time the 1 Heard Penitas well was completed, the river was 700 ft. distant. During the spring floods of 1948 the river cut back to a point just 80 ft. away from the well. With one well, and possibly two, in danger of being lost due to river encroachment, the urgent need

*La Gloria Corp., Corpus Christi, Tex.

for protective measures along the river was definitely established.

Revetments of various types have been constructed at numerous locations along the river by the Internationary Boundary Commission to protect government installations. Existing treaties between Mexico and the United States prohibit the construction of works that obstruct the flow of the river or tend to deflect its current. This prohibition limits the type of work that can be performed to revetment only.

The essential features of the revetment designed by La Gloria for the Penitas installation are: banks cut to a three-to-one slope from the water's edge, a series of wire-fabric fences built transverse to the sloping bank of the river, and wire-fabric nets extending from the fences out into the river. The wire-fabric fencing is supported by second-hand boiler-tube posts. Each fence post is guyed upstream and downstream to adjacent fences. The wire-fabric nets are supported by messenger cables which are strung transverse to the water's edge. The messenger cables are anchored by a toe cable which runs parallel to the bank, and supported by a main cable, also parallel to the bank between the toe cable and the water's edge. Concrete weights placed at regular intervals anchor the nets to the sloping bed of the river. The main cable is supported by empty oil drums sufficient in number to support the combined weight of nets and cables.

This type of revetment is not intended to cut off or entirely divert the current, but rather to decelerate its velocity so that the material carried by the river is deposited between the fences and nets. The revetment is eventually buried in this hydraulic fill.

The installation placed by La Gloria for the immediate protection of a producing lease has been very effective. However, observations to date have indicated that the slight restriction of the channel created is causing changes in the river current, which are resulting in bank erosion just above and slightly below the installed work. This new erosion requires the placing of additional revetment. It will therefore be necessary to increase the designed length of this revetment from 2,000 to 2,700 ft.

New Techniques Enable Operators Meet Demand

(Continued from page 189)

out slips was developed by a Houstonian and received wide field use. Rubber packing elements, which are inflated hydraulically, are the key components of the newly developed equipment. . . . Stanolind Oil & Gas Co. disclosed to the industry its **downhole flow meter** for measuring fluid flow in a well. This particular meter

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utilizes a hot-wire anemometer as its basic component. A service company developed a device to do the same job using a vane rather than the anemometer to determine flow. . .

Increasing use was made of a tool known as a **jet-type casing cutter.** Shaped charges cut the pipe after the instrument has been run into the hole on a wire line. . . **Jet perforating** became more widely used during the year. . . Experimental use was made of **low-water-loss cements,** developed to reduce water contamination of producing formations. Water loss is from 12 to 50 cc. as compared with 2,300 cc. for some conventional cements. . .

At Port Lavaca, Tex., 13 miles of 8⅝-in. **offshore pipe line** was laid to transport natural gas from Matagorda field in Matagorda Bay to Aluminum Co. of America's new plant. Interest in the project was high, because of the experience which might help in solving producing problems in other offshore fields. Lavaca Pipe Line Co., a wholly owned Alcoa subsidiary, let the construction job to Continental Construction Co. . .

Field use was made of a new logging system, **acoustic impedance logging,** a development of Humble Oil & Refining Co. The system utilizes a long nickel tube vibrating radially in a bore hole to measure variations in hardness and density in the formation penetrated. The logs obtained are independent of the mud except when it contains air bubbles, apparently independent of the hole diameter, and not dependent on any transient conditions of the hole. Speed of logging is limited only by the mechanical limitations of the hoist used. . . . Increasing use was made during the year of **plastic and chemicals** in workover jobs on older producing wells. These materials were used to remove paraffin, drilling mud, salt, and silt. . . **Special well heads and wire-line lubricators** which allow measuring instruments to be run down the annulus appeared in many places. . .

Tubing tool joints are receiving increasing use by Gulf Coast operators on workover and completion operations where production tubing is used for the drill string. This relatively new procedure has been developed for two primary reasons: to protect the tubing joints from excessive wear, and to shorten round-trip time. . . New completion procedures include the use of **mud acid ahead of cement.** Since May 1948 more than 250 cement squeeze jobs on the Texas-Louisiana Gulf Coast have utilized this procedure. Purpose of the mud acid is to remove the mud sheath, or filter cake, on the wall of the hole behind the casing which is responsible for the failure of many cement squeeze jobs. . .

Use of **scratchers and centralizers** in the cementing of casing became firmly established as standard procedure during the past year. Several improvements were made in the procedures used with these new completion aids. . . Phillips Petroleum Co., working with equipment and supply firms, developed a **special tubing joint** designed for use in high-pressure condensate wells. Step threads are used in the joint with an O-ring seal between the steps. Another tubing joint, similar to a seal-grip tool joint, has been developed for the same type of service. It also utilizes an O-ring seal, and is flash-welded to the tubing. . . Of interest was an instrument using electromagnets to find the freeze point of **stuck pipe strings.** A wire line is used to run the tool into the hole.

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Petrochemicals

BIGGEST chemical news on the Gulf Coast during the past year was the completion of **Shell Chemical Corp.'s $50,000,000 postwar expansion program** at its Houston plant. The plant is located adjacent to Shell Oil Co., Inc.'s, 115,000-bbl. refinery and produces 19 major products. . . Of unusual interest in Shell Chemical Corp.'s expansion is the **$8,000,000 synthetic-glycerin plant**—the world's first commercial plant for the manufacture of this petrochemical. . .

At Texas City, Monsanto Chemical Co. dedicated in April its **rebuilt styrene plant.** The original plant was destroyed on April 16, 1947, by the explosion of the ammonium nitrate-laden S. S. Grandcamp. . . Stanton Chemical Co. at Corpus Christi is completing new petrochemical plant **to convert crude petroleum to variety of organical chemical products. . .** In late 1948, McCarthy Chemical Co. completed the first unit in a multi-million-dollar petrochemical development at Winnie, Tex., 25 miles southwest of Beaumont. The plant utilizes residue gas from McCarthy's two adjacent absorption plants to produce formaldehyde, acetaldehyde, and methanol. . .

Diamond Alkali has installed a **semicommercial plant to produce perchlorethylene** at its new caustic-chlorine plant near Houston. . . A $1,500,000 plant to manufacture **ethylene glycol** is being built in Houston by Floz-on Manufacturing Co. of Pittsburgh. . . **A large government ammonia plant** is being erected at the San Jacinto Ordnance Depot in Houston. Hercules Powder Co. has the contract to operate the plant which is being moved to Houston from Louisiana, Mo. . . Gulf Chemical Co. completed this past year a **$1,500,000 phosphate-manufacturing plant** south of Galena Park, Tex. . .

Phillips Chemical Co. started operation early this year at its new **ammonium sulfate plant** in Houston. An annual output of 266,000 tons annually is anticipated. In announcing the new plant Phillips stated its investment in this plant should amount to from 30 to 40 million dollars within 4 or 5 years. . . A Houston plant to manufacture **synthetic resins** has been announced by Reichhold Chemicals, Inc., of Detroit. The initial unit will cost $500,000 and raw materials will include synthetic glycerin from Shell's new plant as well as other petrochemicals. . .

At Brownsville, Tex., the Carthage Hydrocol, Inc., plant for converting natural gas to liquid hydrocarbons is over one-third completed. Byproducts of this synthesis process, totaling about 300,000 lb. daily of water-soluble oxygenated compounds, will be processed into a number of petrochemicals at an adjacent Stanolind Oil & Gas Co. plant. . . E. I. du Pont De Nemours & Co. has purchased 1,700 acres of land near Victoria, Tex., for a proposed plant to make intermediates used in the manufacture of nylon fibers and plastics. . .

In summary, more than 80 chemical manufacturing plants have been built in the Gulf Coast area since 1940. These plants represent an investment of between $600,000,000 and $750,000,000. It has been estimated that, with facilities completed and planned, the **Gulf Coast will have about 85 per cent of the nation's capacity** to produce chemicals from petroleum hydrocarbons.

News Events

MAJOR reductions in the allowable crude-oil production for the Gulf Coast area and all Texas has spotlighted state oil news since the first of the year. A reduction of more than 800,000 bbl. daily has been ordered by the Texas Railroad Commission since December 1948. Leading all states with about 45 per cent of the nation's oil production, Texas was quick to carry out a broad and intensive conservation program when it was apparent that supply had finally caught up with demand. The Railroad Commission reported that it would use its authority to the fullest to enforce conservation. . .

The Texas Legislature passed a resolution condemning the **tidelands decision** of the U. S. Supreme Court and called for a constitutional amendment to "repudiate" this decision. . .

Navigation interests in the Gulf continue fight to restrict drilling wells from an **8-mile lane** from Galveston Bay to a point 25 miles southeast. . . Louisiana Department of Conservation reports reduction by 50 per cent of the volume of **casing-head gas flared** in recent years. . . American Petroleum Institute production meeting at Galveston emphasizes the great strides taken by the industry in **conservation measures. . .**

Fifty-first Texas Legislature had for its consideration numerous oil

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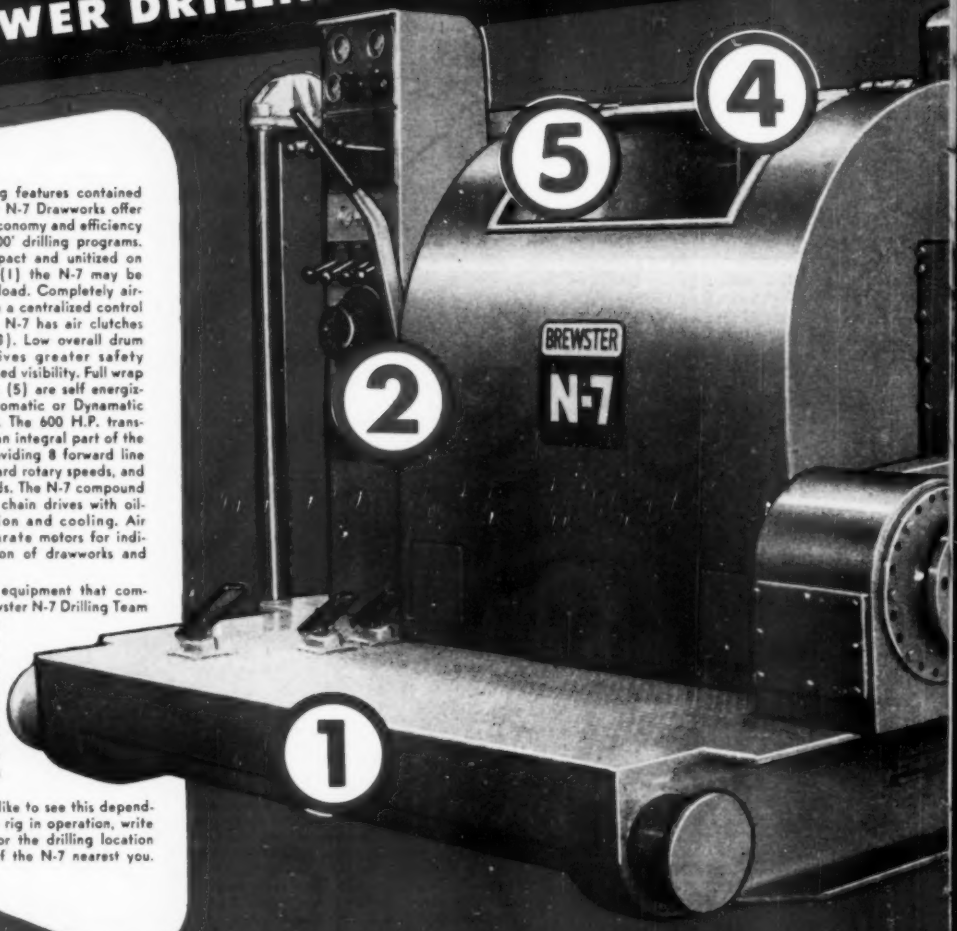

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The matched equipment that completes the Brewster N-7 Drilling Team is shown on the opposite page. Performance in field after field has proved the N-7 Team's efficiency in deep drilling operations.

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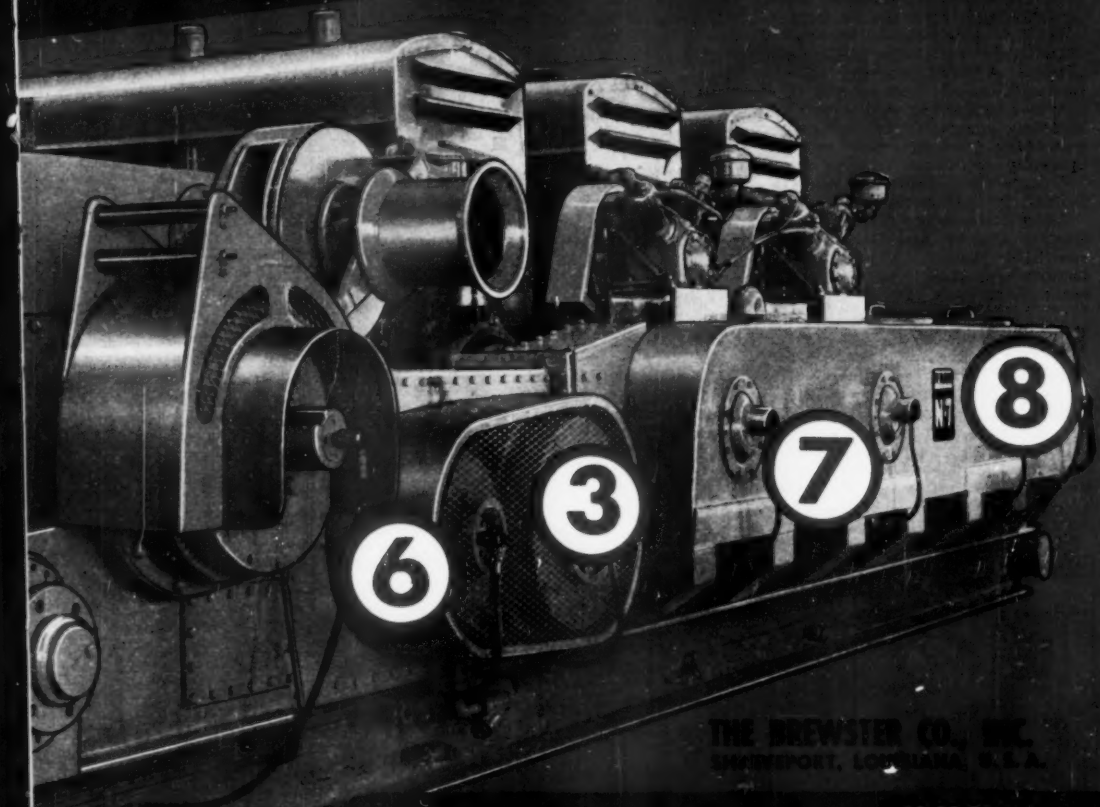

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measures including bills calling for increased taxes on natural gas, gasoline processing tax, revision of unitization laws, seismograph shooting in unleased offshore areas. . .

Texas Supreme Court upholds Railroad Commission's order to shut down wells in the Heyser field of Victoria and Calhoun counties for alleged flaring of casing-head gas. Other fields affected by the **shutdown orders** continue their fight against enforcement. . . American Association of Attorneys General—the leading exponents of state ownership of the tidelands—met in Houston and drew up plans for coming federal battle. . . Insurance companies, through extensive study and research of offshore operating conditions, seek to establish more stable **insurance rates** for industry in Gulf operations. . .

Texas Independent Producers and Royalty Owners Association continues fight against high amount of **imports.** Importing companies report reduction for May. . .

Refining

REFINERIES in the Gulf Coast area now represent **32 per cent of the crude oil refining capacity** of the nation and more than 30 per cent of the national cracking capacity. . . It is estimated that, as of January 1, 1949, the value of oil refineries—plants and equipment—was upward of **$800,000,000**. . . More than 38,000 workers were employed in these plants during 1948, with an average income per employe of approximately $4,000 and a **total payroll of $153,000,000. . .**

Value of refinery products in the Gulf area during 1948 totaled upward of $2,520,000,000. . . Because of changing market conditions, refiners were turning attention to **more efficient utilization of top and bottom fractions** in early 1949. . .

Another increasingly important problem, of particular interest to Gulf Coast refiners, concerns a **means of utilizing more natural gasoline and "cycle gas" products.** A rapidly increasing supply of these products poses the problem of a market. Blending these products with motor fuels presents one solution. However, this raises several points: (1) What volatility fuel can be delivered to service stations without undue loss? (2) Will design changes have to be made in automobiles to prevent vapor lock if higher-volatility fuels are provided?

The **surplus of residual fuel oil** on the market is presenting a very considerable problem in early 1949. The situation is affecting small refiners most seriously. Although pinched, few reports were heard of any small refineries closing down. American Mineral Spirits Refining Co., however, discontinued operation at its 13,000-bbl. Corpus Christi refinery. When the plant will reopen depends on the petroleum-products market, John A. Bartlett, vice president and general manager, has said.

Gas Conservation

THE **tremendous postwar gas-conservation program** continued in full force during the past year. For Texas alone, this program represents an investment of more than $250,000,000 in 138 plants to conserve nearly 2¼ billion cubic feet daily of casing-head gas which otherwise would not be fully utilized. Source of these impressive figures is Hines H. Baker, president of Humble Oil & Refining Co.

Speaking in January, Baker said, "Nearly 40 per cent of this postwar program has already been completed and another 36 per cent will be completed in 1949." Baker estimates that by 1950 when Texas' postwar gas conservation program is completed, the amount of casing-head gas conserved will be 90 per cent or more of the maximum that can be economically utilized. . .

Postwar construction has brought the total number of **gasoline plants** in the Gulf Coast sections of Texas, Louisiana, and Mississippi with a liquid production capacity of 1,634,000 gal. per day. . . The Gulf Coast area

THE OIL AND GAS JOURNAL

"Just how did you mean that crack, that what I really need is a new map?"

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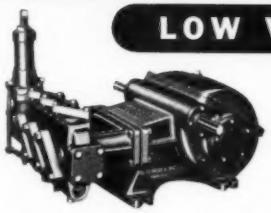

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now has **33 cycling plants** with a gas capacity of 3,561,000,000 standard cubic feet per day. Total liquid production capacity of these plants is 5,044,000 gal. per day. . .

Some operators found it feasible to install **gas plants in very small fields,** an uncommon practice in the past. Western Natural Gas Co. of Houston installed cycling facilities in a three-well field in Live Oak County, Texas. In Goebel field, Western Natural has put into operation a 1,200-hp. plant with a capacity of 30,000 M.c.f. of gas daily.

Pipe Lines

BIG pipe-line news of the past year in the Gulf Coast area was the emphasis on moving the area's **gas to the industrial East.** An important new line was announced, two major applications made to Federal Power Commission, and expansion programs carried out on existing lines. . . Actual pipe laying is scheduled to start this month on the **longest pipe line ever built as a single undertaking.** It will originate in the lower Rio Grande Valley and run a major portion of its course through the Gulf Coast area. The projected 2,250-mile Trans-Continental Gas Pipe Line Corp. line will terminate in New York City and is expected to cost around $200,000,000. Headquarters for Trans-Continental have been established in Houston. Final completion of the line is expected by January 1, 1951. The main line will consist of 1,210 miles of 30-in., 558 miles of 26-in., and 71 miles of 20-in., totaling 1,839 miles. The additional 411 miles of the project consists of lateral lines to be built in several pipe diameters ranging from 6 to 16-in. . .

Gulfcoast Northern Gas Co., a new corporation, has an application on file with FPC to construct a **1,184-mile, 26-in. gas pipe line from the Gulf Coast to the Chicago area.** The proposed line would originate in the vicinity of Corpus Christi and will cost an estimated $119,000,000. It is expected to have an initial capacity of 245,000,000 cu. ft. per day, increasing to an ultimate capacity of 350,000,000 cu. ft. per day. F. E. Stanley, president of Midwestern Constructors, Inc., Tulsa, is president of the new firm. . .

A second large gas pipe line, under consideration by FPC, which proposes to utilize Gulf Coast gas is that of Piedmont Natural Gas Corp. Piedmont has filed application for authority to build a **990-mile, 20-in. line from the Upper Gulf Coast area to Danville, Va.,** at an estimated cost of $75,444,000. . .

The last of the facilities needed to make **deliveries of 600,000 M.c.f. per day** were placed in service November 1948 by Tennessee Gas Transmission Co. on its McAllen, Tex.-to-West Virginia line. The additional facilities completed during 1948 consisted of 106 miles of 31-in., 101 miles of 30-in., 479 miles of 26-in., 141 miles of 24-in. main transmission loop lines, and 73 miles of 20-in. lateral lines. In addition, four new compressor stations with a total of 30,000 rated compressor horsepower were completed and 78,400 hp. added to existing compressor stations. Tennessee Gas Transmission is expected to make an announcement soon regarding letting of contracts for 200 miles of looping in Louisiana, Mississippi, and Tennessee. . . Atlantic Pipe Line Co. has under construction a 382-mile, 10-in. line for moving **crude oil from Crane in West Texas to Refugio** in the Corpus Christi area. Contractor is A. C. Holder Construction Co.

United Natural Hearing Postponed Until July 11

Federal Power Commission has postponed until July 11 hearing previously scheduled early in May, in Washington, in the proceeding involving an FPC-initiated investigation of rates charged by United Natural Gas Co. for sale of natural gas, subject to the commission's jurisdiction.

United Natural requested the hearings be postponed.

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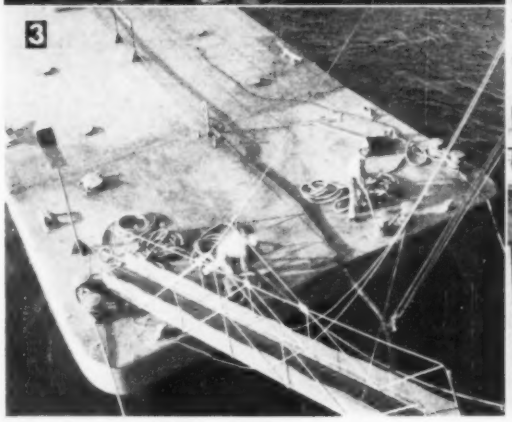
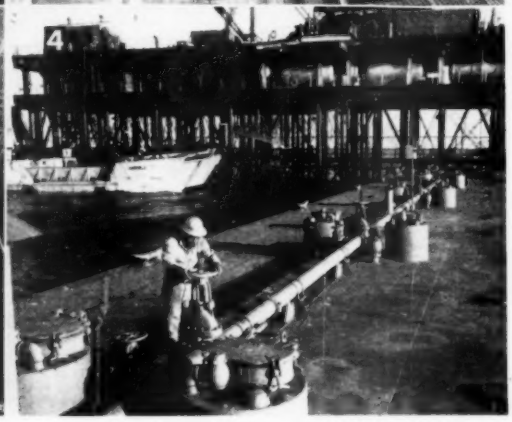




1. **TWO OFFSHORE OIL WELLS** are shown here, with blowout preventers at right for third well now being drilled. Scene is lower deck of Humble's double deck $1,200,000 drilling platform at its Grand Isle discovery well, 7 miles off Grand Isle, La. Production is from sands at 8,650-65 and 9,221-36 ft. Seven wells can be drilled from this platform. 2. **OFFSHORE GAS-OIL SEPARATORS.** These are located on upper deck of Humble's Grand Isle No. 1 platform; oil barge is moored to square buoy in background. At left, R. L. McAdams is shown making centrifuge tests. 3. **WALKWAY TO OIL BARGE.** This barge serves as "production" or stock tanks. The stock gagers are tying the oil barge to drilling platform with 2-in. ropes; these will snap and let barge swing free to mooring buoy should waves become too high. 4. **MANIFOLD ON OIL BARGE.** Operator is switching compartments during loading period. Barge has capacity of 9,555 bbl. but may be loaded only to 6,000 bbl. in order to navigate shallow bayous and canals which permit maximum draft of 5 ft.

Moving Offshore Oil to Land Is Major Operation

TRANSPORTATION of oil produced from "island" locations in open gulf waters is a new and relatively difficult technique. Like other offshore operations, transporting the crude oil produced from those wells to land is handicapped by high waves and winds. Heavy seas are a constant threat to loading and movement of barges, the only method used so far to move oil to shore. Photographs and information given here are furnished by the "Humble Way" publication of Humble Oil & Refining Co.

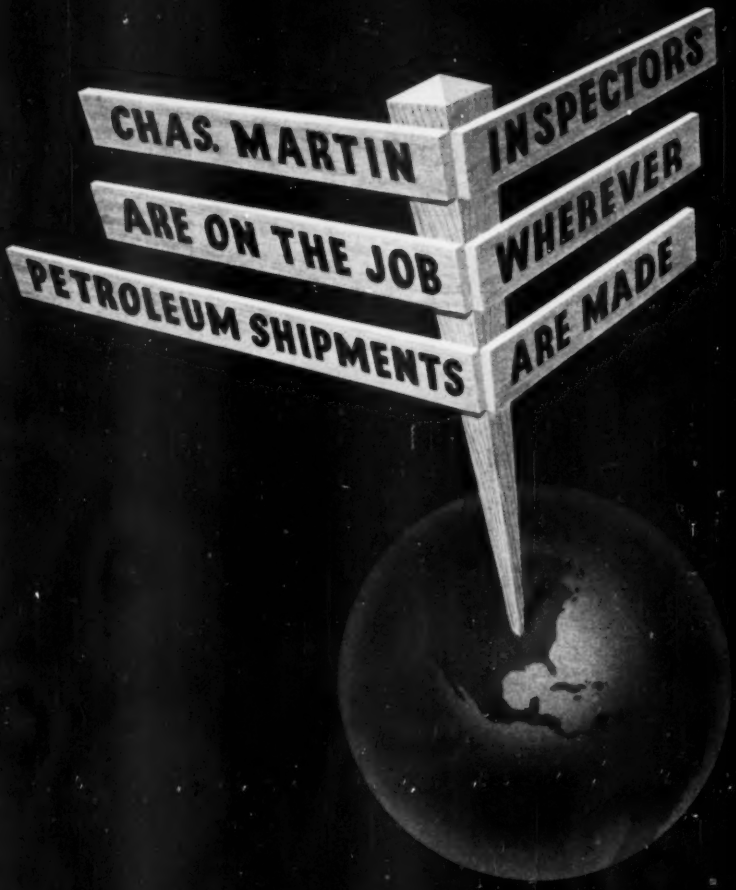
Humble uses eight barges for transporting the crude oil produced from the company's five oil wells in the waters off Grand Isle, La. The largest barge, No. 100 (195 ft. long, capacity 9,555 bbl.), is shown on these pages receiving the production of the two oil wells on Humble's Grande Isle No. 1 platform 7 miles off Grand Isle. Two of Humble's other oil wells are at Caminada Pass, 6 miles west, and one at South Timbalier, 45 miles southwest, of the large platform. The company has one gas well at Pelican Isle, 15 miles east of Grand Isle No. 1.

After a barge is loaded, it is towed to Avondale, La., on the Mississippi River above New Orleans, where the oil is discharged at a pipe-line terminal. A sea-going tug moves the oil barge from the drilling platform to Humble's Grand Isle terminal. There a small inshore tug continues the barge on its journey through Barataria Bay and the bayous and canals to the Mississippi River at Harvey, La., across from New Orleans. Since all fresh water and most of the supplies for all of Humble's Grand Isle operations must come from New Orleans, a water or freight barge may be taken along to Harvey to be loaded for the return trip. From Grand Isle No. 1 platform to Avondale is about 65 miles by water, and the tow takes about 12 hours. The average round trip requires about 35 hours.

A barge is kept alongside each platform loading continuously as the weather and waves permit. After the crude oil is discharged at Avondale, the empty barges are returned to Humble's Grand Isle terminal until needed.

The wandering bayous and canals between Grand Isle and Harvey are rather shallow, and traffic is limited to boats with a draft of 5 ft. or less. For this reason, Barge No. 100, although of 9,555 bbl. capacity, may be loaded to only 6,000 bbl. Humble's other barges, of 6,500 and 3,000 bbl. capacity, also may be only partially filled to keep within the 5-ft. draft limitation.

In loading, the barges remain alongside the platforms for several days to receive a cargo of crude oil. Twelve days or more are required to load Barge No. 100 from the two wells on the Grand Isle No. 1 platform. Even



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more time may be necessary if the barge must be cut loose from the platform when the waves become too high. Hawsers only 2 in. in diameter are used to tie the barges to the platform, so that in rough water they will snap before the platform is damaged.

The barges are also moored to a special mooring buoy secured about 300 ft. from each platform by four heavy anchors. If a barge is cut loose or breaks free from a platform, it will swing from the buoy until again moved to the platform after the high waves have subsided. Offshore oil-transportation costs have been substantially reduced by the use of the mooring buoys, as the need for a tug constantly standing by is eliminated. Tugs are now needed only for moving the barges.

Humble's engineers are continuing extensive studies to develop an efficient method of transporting offshore oil more easily and inexpensively. An alternate method, underwater pipe lines, is under consideration, but must await field development to make the project feasible. Conservative estimates set the cost of an 8-in. underwater pipe line 20 miles long, properly laid and protected, at about $1,000,000—three times the cost of a similar line laid on land.

Gulf Coast Oil . . . . . .

(Continued from page 192)

cent of the 1948 production. Let's check this a little further. You then find that these 24 fields have accounted for 67 per cent of all the oil produced in the Gulf Coast up to January 1, 1949. They have nearly 35 per cent of the proven reserves in the whole area.

Or let's take it another way. The accumulated production plus the proven reserves represents the total oil we have found. As of January 1, 1949, you will find that out of the whole 900, these 24 fields account for just a shade under 50 per cent of all the oil found in the Gulf Coast. You will find the detailed figures on this in Table 2.

When you start to think about offshore operations and their high cost, the figures in Table 2 are likely to get your mind working something like this. Three fields out of every hundred we find are extremely rich. Chances are that in the offshore area, even with high drilling and operating costs, our per barrel costs in field like this would be low enough to make big profits.

On land we make out all right over the long pull with three big fields out of every hundred. Now what are our offshore costs going to be? If they are double our land costs, and we could work out some way to find six big fields out of every hundred, we would probably still come out about as well off as we do on land. If our offshore costs are three times as high

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TABLE 2—GULF COAST OIL
(In millions of barrels

	1948 production	As of January 1, 1949 — Cumulative production	Est. proven reserves	Total oil found
24 major fields	203	3,607	2,328	5,935
Total Gulf Coast	506	5,388	6,680	12,068
Major field (per cent)	40.0	67.0	34.8	49.2

as on land, then we will have to find some way to shift the odds so that nine fields out of every hundred found will be big ones.

Now what about land operations? Did you ever stop to think about the leverage factor on profits? You know what even a 10-cent or 15-cent price increase means to net profits in normal times when costs of material and labor are pretty stable. But how about your profit margin per barrel in the rich fields, as compared to your profit margin per barrel in the other fields? When you double or treble the recoverable barrels of oil per well drilled, what happens to your profits? On an average that is what would happen if you could double or treble the ratio of big fields found.

Your next question is probably this. Is there any known way of getting an indication of how to go about looking for major fields instead of just any old oil field? It doesn't have to be perfect; if it just steps up our chances to 6 or 9 per 100 from the present rate of 3 per 100, we will make plenty of profits. Right now the answer is that there is nothing publicly known that gives a definite answer; but that there is one line of work going on that just might be on the right track. That line is part of the research attack on problems of sedimentology.

Sedimentology Vs. Oil Production

Look at Fig. 3. This is a rough approximation (drawn from memory) of diagrams shown at the St. Louis exploration convention a few weeks ago. It represents an attempt to tie accumulated oil production, geology, and sedimentology together. The diagrams were presented as a part of a symposium of papers the sedimentologists held on their problems. (Incidentally these figures on oil production are not exactly on the same basis as those presented elsewhere in this article.)

Now you may or may not be one of those who think of a research sedimentologist as a sort of impractical long-haired scientist. But that diagram has some things in it that make good sense to any Gulf Coast operator. Look at the wide spread of pretty good Marginulina-Frio production as compared to the narrow Wilcox-Yegua production. Look how both of them pinch out to the east, and how the Catahoula, Middle Miocene, and Upper Miocene plus Pliocene come in where the Louisiana delta sticks out into the gulf.

Let's take another look at that Wilcox-Yegua production on the diagram. According to the diagram there are only two narrow areas where really good Wilcox-Yegua production has been found. Every Gulf Coast operator knows that a good Marginulina-Frio prospect is easier to deal, and will bring a higher price on an average than a Wilcox-Yegua prospect that looks just as good geologically, and with just as good a geophysical picture. This diagram shows why.

But—here is one of the most promising things about this diagram. It indicates that the conditions under which good Wilcox-Yegua production can be found have a very narrow range. So, the sedimentologist has something he can get his teeth into. What conditions change so sharply in the Wilcox-Yegua between the areas of good production and poor? How do these changes compare with the same conditions in the Marginulina-Frio where they don't change nearly so sharply? Look at that point between the Rio Grande embayment and the Central embayment, where the Wilcox-Yegua simply produces nothing, and even the Marginulina-Frio shrinks noticeably. Why?

Some Logical Questions

Why is the Catahoula so uniformly poor over a wide area? How about the Middle Miocene? Is that peak on the right simply a matter of the location of the wells drilled so far? Is it because the Miocene and Pliocene west of there is out under the offshore area? Here the answer is probably "yes." But, assuming this is true—what is a similar diagram going to look like 10 or 15 years from now, when we have done a lot of offshore drilling in the area opposite the Texas coast line? Where will the Middle Miocene and the Upper Miocene plus Pliocene peak, if any, be then? Will it be shaped like the Marginulina-Frio diagram, or like the Wilcox-Yegua diagram? It would be worth much money to you to be able to guess right today on what the Miocene-Pliocene diagram will eventually look like.

From this it begins to appear that the sedimentologists are on a trail that looks promising. This is neither the time nor the place to go into many scientific and technical details about what they are doing and how they are going about it. As long as eventually it ties in with a diagram like this, it seems to have a practical end point

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Where the top of the lost pipe is resting in a cave or washout, having the knuckle joint already in the hole ready for use, your fishing job can still be done in only one trip. Under such conditions, the availability of the knuckle joint will save sufficient time and expense to more than pay for itself.

OPERATION

The knuckling action is accomplished by regular mud pressure applied to the fishing string. In Fig. 2, note the bomb shaped restriction plug seated in the control piston. This plug is dropped in the fishing string and is pumped down where it seats itself. By restricting the passage of

Continued on next page

Fig. 1

Fig. 2

KNUCKLE JOINT ANGLING ACTION

Left view shows construction of LeBus Knuckle Joint. Notice full opening bore, rugged ball-and-socket construction. Right view shows Restriction Plug in place so that mud pressure actuates piston causing joint to knuckle. Using an overshot and hook, fish can be "reached for" as shown in illustration on right hand page.

Fig. 3

REMOVING RESTRICTION PLUG

If fish is found to be stuck after contacted and it is necessary to cut it loose, a restriction plug overshot is lowered into hole either on small pipe string or wire line and restriction plug is withdrawn so that cutter can be run as illustrated in Figure 5.

LeBus Knuckle Joint—

Continued from preceding page

fluid, the control piston is forced downward causing the knuckling action. Note also that the restriction plug has a small passage so that the fluid flow is not completely cut off from the fishing tools. After the pipe has been contacted and is found to be stuck, the standard procedure is to cut the pipe loose. The restriction plug is removed (Fig. 3) by running a restriction plug overshot on a small string of pipe or wire line. When the FO-47 Knuckle Joint is used, the full opening bore permits using an inside cutter as shown in Figure 5. Should the fish be located under a ledge or in a key seat where it is not practical to use a wall hook, (Fig. 4) a mill may be run below the overshot to ream down to the top of the lost pipe. After the ledge is removed, the pipe can be picked up with standard operating procedure.

It is easy to see how the FO-47 Knuckle Joint can be applied to your over-all pipe or collar fishing jobs. From the above description of operations, you can probably recall from your own experiences some instances where the use of this new tool would have saved considerable time and more money on one job than its original cost.

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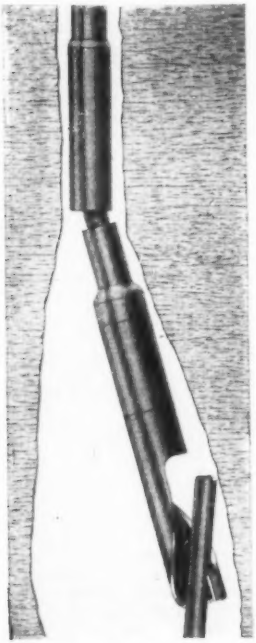

Fig. 4

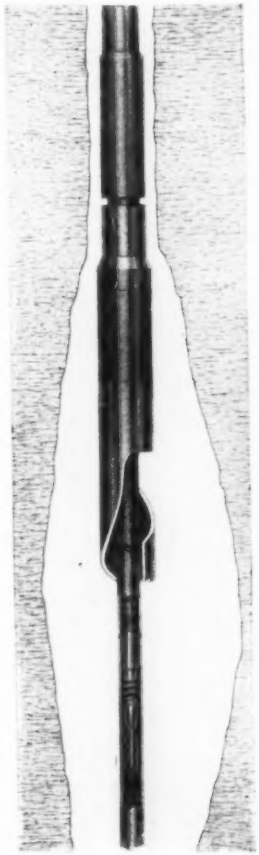

Fig. 5

OPERATION OF THE LeBUS KNUCKLE JOINT

Shown above is the Knuckle Joint "reaching for" the fish with a wall hook. This shows how easily the Knuckle Joint contacts the fish in a large wash-out. When fish is in a well conditioned hole, Knuckle Joint flexibility helps overshot contact fish more quickly. On right is shown an inside cutter being run below fishing tools to cut stuck pipe loose. Logging instruments can also be run through the Knuckle Joint for checking directional alignment.

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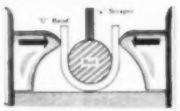
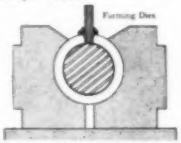


Cross section showing "U" band being die-formed around rod to within a fraction of an inch of scraper blades.



Cross section showing band held under pressure around rod while ends of band are shrunk-grip attached to scraper blade.

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Just one more point. We said this work of the sedimentologists looked as though it might tie in with the problem of how to find major fields. How? The answer is easy. The diagram in Fig. 3 shows accumulated production to date according to areas mapped out by the sedimentologists. But in Table 2, you remember that we showed that 67 per cent of the accumulated production of the whole Gulf Coast area had come from these 24 major fields. Therefore those peaks or high points in the sedimentologists' diagram just have to coincide with the location of most of the major fields. Two-thirds of all the shaded area in the whole diagram comes from the 24 fields.

Now it is just plain horse sense that once a sedimentologist had gone as far as this in the things that have been made public, he would go at least one step further. In compiling his figures of accumulated production, he couldn't help but notice how big a proportion of his total came from just a few spots. Even if he hadn't been reading about these data in The Oil and Gas Journal for the last 3 years, *(see The Oil and Gas Journal, July 27, 1946, page 146; January 25, 1947, page 152; July 26, 1947, page 187; January 29, 1948, page 167; July 29, 1948, page 185; and January 27, 1949, page 180);* he couldn't have missed that point.

General Principles Worked Out

So it is reasonable to assume that the sedimentologists are working to see if they can narrow the range of their research into critical conditions, by studying the areas around these 24 major fields. They are not shooting blindly in their research. They have many general principles fairly well worked out, so that they can coordinate several different kinds of information into one common picture. *(See "Where Should You Look for Future Oil Fields?," The Oil and Gas Journal, December 23, 1948, page 55.)*

On the other hand, their plea for the need for a general program of fundamental research in some problems in sedimentology indicates there are still missing links of evidence. This program of fundamental research has already received the approval of the American Association of Petroleum Geologists, and tentative approval in principle by the Research Committee of the American Petroleum Institute. If these sedimentologists can keep coming up with pieces of important evidence that any oil man can understand, the chances are the industry will be liberal in financing the kind of research work they say they need.

The possible cut in costs per barrel that would result from doubling or trebling the chances of finding a major field is a research target that the most economy-minded oil executive will consider very seriously.

Gulf Coast Research Front

(Continued from page 195)

required the development of new methods of processing the crudes in order to have a profitable market for all products. This has led to greater utilization of methods of reforming the hydrocarbons.

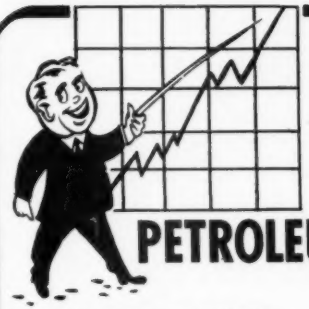
The petrochemical industry, recently developed on the Gulf Coast, continues to grow. The evolution of the petrochemical industry has been based on the research developments which oil companies and others have had under way for many years. It represents a continued trend to the utilization of crude petroleum to make items having a greater value than the mass produced conventional petroleum product. It is a very significant trend of great importance in the economy of the Southwest.

Through the development of new products and markets, the refinery and marketing groups of the industry have created a demand which has in turn placed greater necessity on the development of new petroleum reserves. Since most of the easily located oil reservoirs have been found, this has imposed on the geophysicist a necessity for developing new equipments and techniques. The Gulf Coast area, being a center of geophysical activity for both regional and international exploration, has been active in developing the equipment and techniques necessary in the search for new and deeper fields.

One of the newer research laboratories in the area is the Sun Oil Co.'s $350,000 geophysical laboratory at Amelia, adjacent to Beaumont, Tex. This laboratory is devoting considerable attention to offshore operation with particular emphasis on application of radar and shoran to this problem.

The more intensive search for petroleum has required the development of equipment having greater precision. Offshore exploration has required the use of new types of equipment and the development of new techniques. The problems involved in exploration on the Gulf shelf in up to several hundred feet of water, are quite different from those on shore. Among the developments during the past year was a new method of seismic exploration reported in the November 11 issue of The Oil and Gas Journal, page 242. This unique method utilizing multiple air shots eliminates the need for shot holes. In addition to the reduction of cost of operation, the method has been able to get records under conditions where other methods have failed.

The new fields which have been located are, on the average, increasingly deeper. This has imposed new problems on the drilling and production groups. The increasing cost of drilling these deeper wells has also



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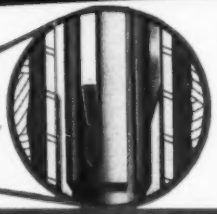

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started a trend toward finding new methods and equipment. The percussion bit is one important development in this direction. Its record in the drilling of hard formations indicates a sizable reduction of drilling time where such formations are encountered. Another development, of equal importance in soft formations, is the jet-type bit which gives more rapid penetration rates. A trend toward equipment which will give automatic operation is aimed toward the speeding up of drilling operations and the reduction of costs.

The development of equipment and techniques for offshore drilling has been an outstanding engineering accomplishment. The building of structures in 50 ft. of water to carry the heavy loads of drilling equipment and to provide a safe working base has been carried out very successfully. Engineers have had to do this work with little information on the character of the formations into which the piling is driven and with very meager data on the oceanographic conditions which exist in the Gulf of Mexico.

The two oceanographic institutes in this country, Woods Hole and Scripps, operating in the Atlantic and Pacific respectively, have been so busy with oceanographic problems of those areas that they have not found time to investigate conditions or collect information on the gulf. Recently, Southwest Research Institute has announced the establishment of a division of oceanography and meteorology to provide a facility on the Gulf Coast for the study of problems of the gulf.

One of the most potentially fruitful subjects for research continues to be that of oil reservoirs. These problems are very difficult to handle. However, the potential value which can accrue from research in this field makes it a most desirable field to study both from the standpoint of the value of the returns from such work and its importance in the over-all conservation for our petroleum resources.

The Shell exploration and production research laboratory located on Bellaire Boulevard in Houston is one of the largest laboratories in the Gulf Coast region devoting most of its attention to production and related problems. This laboratory represents one of the most modern types of such construction, being completely air conditioned, soundproof, and having the latest type of services such as electrostatic dust precipitators, distillation equipment, and similar features. One of the major types of programs being carried out by this laboratory is a study in reservoir characteristics and the thermodynamic properties of reservoir fluid.

Perhaps even more significant than the evidence of research activity as shown by new products and methods has been the industry's realization of the need for concerted action on an industry-wide basis on their common-

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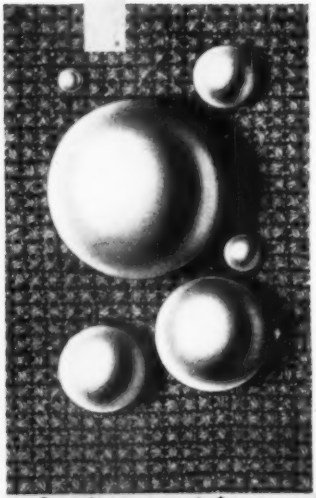

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denominator type of problem. An actual example of this type of activity is the formation of Drilling Research, Inc., which plans a 3-year program to spend $750,000 for research in the field of drilling. Forty-one companies and individuals have grouped together with C. P. Dimit as president and Dr. J. V. Pennington as technical director to coordinate their activities on the basic problems concerned with drilling research.

On problems of this type in which there is a common interest, the fundamental phase of the research can best be handled by a coordinated effort to eliminate unnecessary duplication. This type of activity does not attempt to solve all of the problems or to reduce the results to commercial reality. It does, however, furnish an economical way of building up the fundamental information needed for general long-term development in a particular field. Once the fundamental information has been collected in the field, the utilization of individual ingenuity and the free enterprise system in the development of the final commercial product follows. This banding together of interested groups on a joint basis keeps the cost of research to a minimum and permits its widest development. It is only by increasing its stock pile of fundamental data and information that the industry can look forward to continued status as the most successful and progressive American industry.

The research front in the Gulf Coast area shows an increasing expansion of activities. The general technical development in refining, petroleum processing, exploration, drilling, production, and related fields continues at an increasingly rapid pace. Several oil companies are in the process of developing laboratories in this region in addition to those mentioned specifically. These include Texas Co., Gulf Oil Corp., and Pan American Production Co.

Two general research facilities in this area available to both large and small companies have continued to expand. Southwest Research Institute of San Antonio and Houston has recently announced the establishment of a division of oceanography and meteorology and petroleum technology at Houston in addition to the general laboratories devoted to agriculture, biology, engineering, physics, and chemistry at San Antonio. Texas A. & M. College Research Foundation, College Station, Tex., likewise has continued to expand its activities in the general research field. The establishment of more research laboratories in the area is an index of the progressiveness of this region. The effects and results of such research activities will not appear for several years. However, their influence will insure the continued industrial development of this region and will have a marked effect on the region's economy.

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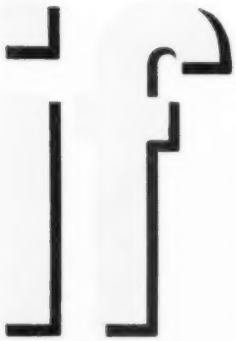

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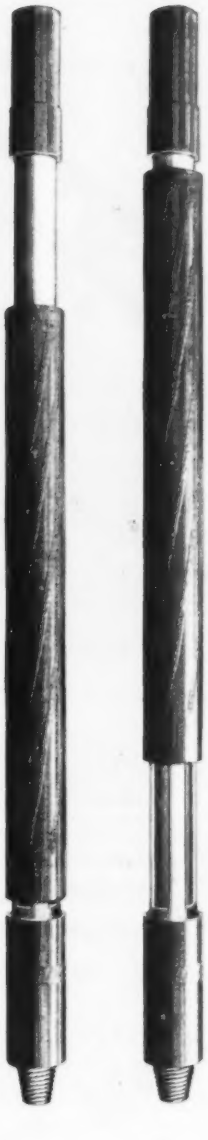

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Of the three states here reviewed, Georgia as yet has not produced commercial oil. Florida's first production came September 26, 1943, and Alabama's a short time later, February 12, 1944. These discoveries have stimulated interest in the potentialities of this southeastern area and without doubt this growing interest will result in much additional prospecting. It is timely therefore to review the history of development and growth of the oil industry in the Southeast.

The author is director of the Florida Geological Survey, Tallahassee. **Appreciation is expressed to Dr. Walter B. Jones, director and state geologist, and Dr. Stewart J. Lloyd, assistant state geologist, Alabama, and to several geologists with the major oil companies with offices in Tallahassee, for the generous responses to requests for data in compiling this article.**

Map of Alabama-Georgia-Florida Gulf Coast area—Alabama (white rings are well locations drilled or drilling January 1, 1948-April 1, 1949. Area III is rated as having best oil possibilities, Area II next, Area I the least possibilities); George (solid white circles are well locations drilled 1938-1948 inclusive); Florida (solid white circles are wells completed during 1948 and to April 1, 1949. White rings denote well locations completed or drilling January 1 to April 1, 1949)

OIL AND GAS DEVELOPMENTS IN *Florida, Georgia, and Alabama During 1948*

by Herman Gunter

IN Florida the records indicate that for almost 50 years attempts have been made to discover oil or gas. It was about 1900 that the first well of any record was drilled at Pensacola, Escambia County, extreme western Florida. Prior to 1902 three wells were drilled in that county and although these would not now be considered deep they were for that early day of more than ordinary depth, ranging from 1,320 to 1,720 ft. Apparently discouraged at the results of prospecting in western Florida, attention was next turned to central peninsular Florida. Perhaps the geology of this area was observed as probably structurally promising since the area selected was within the "Ocala uplift" territory, that part of Florida where the Eocene limestones are either exposed or thinly covered with surface materials.

Following these prospecting attempts of the early 1900's, interest in the possibility of finding oil or gas in Florida has waxed and waned. As is ordinarily true some of this early interest was induced by promoters of the "temporary" type. There were, however, many serious, bona fide attempts to find oil by reputable operators of highest integrity and whose motives were never questioned. This more or less spasmodic prospecting might be said to have continued until about 1939 when the first well in Florida of more than 10,000 ft. was completed.

During this first period, however, from the beginning in 1900 to 1939 there were at least 87 wells drilled. Some of these perhaps should not be labeled as oil tests except for the fact that they were so designated by

the operators. It must be said, too, that a number of the wells drilled during this first period were as high-class operations as could be desired; specific mention could be made but this is not necessary. The deepest test drilled prior to the 10,006-ft. well in 1939 in Monroe County was 6,180-ft. test in Marion County, near Ocala, in 1928.

First Production

The completion of a deep well by Peninsular Oil & Refining Co. at Pinecrest in Monroe County, some 50 miles west of Miami, in May 1939 makes an appropriate division between early prospecting in Florida and the prospecting which resulted in developing production. This well was completed at a depth of 10,006 ft. and was drilled under constant supervision of a geologist who kept full and complete data on the formations penetrated supplemented by carefully collected cuttings and cores. The data yielded by the drilling of this well encouraged further prospecting by Humble Oil & Refining Co. of which the Peninsular company was a subsidiary.

Humble on February 23, 1943, spudded its 1 Gulf Coast Realties Corp. at Sunniland, Collier County, about 45 miles northwest from Peninsular 1 Cory. As strange as it may seem this first test by a major oil company in Florida resulted in finding oil. It was brought in September 26, 1943, at a total depth of 11,626 ft. The producing zone was from 11,613 to 11,626 ft. in a Lower Cretaceous limestone with irregular layers and thicknesses which is correlated with the Glen Rose.

Results of Discovery

This discovery immediately gave impetus to the already active exploration program and leasing of properties over the entire state got under full swing. Little attention was given to location with respect to possible geological or structural conditions. It was a matter of getting acreage first and evaluating such conditions later. A number of the major oil-producing companies thus obtained and have held large acreages under lease in Florida. Some of these companies have exercised their exploration privileges and as a consequence large blocks have been dropped while still others have been retained. During this period from 1940 through December 31, 1949, along with all leasing activity there were 129 wells drilled. Many of these are what may properly be termed deep wells, 10,000 ft. or more in depth. Their locations range from the western or panhandle portion of the state to the keys fringing the southern extremity of the mainland of Florida. The accompanying map indicates the approximate location of wells drilled in 1948 and 1949.

One well completed during this latter period of exploration deserves special mention because of its unusual depth. This is Gulf Oil Corp. 1 State of Florida, Lease 373, drilled by Gulf off of Big Pine Key about 30 miles east of Key West, Monroe County. It was begun November 7, 1945, and completed April 1, 1947, at a total depth of 15,455 ft. The drilling contractor was Lyle Cashion of Laurel, Miss. The well terminated in a dense, gray, and tan limestone, interspersed with anhydrite, in which irregular shows of dead oil were present. This limestone has been determined to be of Lower Cretaceous age.

Deepest test in Florida. Gulf Oil Corp. 1 State of Florida No. 1, Lease 373, in Coupon Bight, Big Pine Key, about 30 miles east of Key West, extreme southern Florida. Abandoned April 1, 1947, at a total depth of 15,455 ft. in dense limestone with shows of dead oil. (Photo courtesy B. W. Haywood, Gulf Oil Corp., and permission to publish from Murray L. Johnston, zone agent, Tampa, Fla.)

Current Activities

Leasing in Florida has quieted to the extent that there are now but few transactions. As of January 1, 1949, there were in Florida near 23,000,000 acres under lease. Among the largest of these lease holders were the following: Humble Oil & Refining Co., Coastal Petroleum Co., Gulf Oil Corp., Magnolia Petroleum Co., Sun Oil Co., Stanolind Oil & Gas Co., Hunt Oil Co., The Texas Co., Ohio Oil Co., Phillips Petroleum Co., Sinclair Prairie Oil Co., Pure Oil Co., Tide Water Associated Oil Co., The California Co. There are a number of other major companies and independents holding leases but those mentioned have total of 100,000 or more acres.

The year 1949 began with particularly bright prospects. On every hand one would hear reports of an accelerated prospecting program contemplated, and plans were actually made for a number of wells to be drilled. Some change in this picture has come about, however, which has caused these expansions to be held in abeyance at least for the time being. The first of the year found Florida with five wells in process of drilling in as many different counties. These have all been completed and abandoned as dry. Since January 1, 1949, seven wells have been started or locations made in four counties. Furthermore, one of these, namely, Humble "B" 2 Lee Tide Water Cypress Lumber Co., located about 4 miles northwest of Sunniland, was completed March 24, 1949, with initial production flowing 519 bbl. in 24 hours on a ¼-in. choke. This ranks with the best wells in Sunniland field. Three additional completions have been made, all dry and abandoned. Currently drilling are the following:

Sun 1 H. T. Parker, 3 miles north of Silver Springs, Marion County.

Humble 14 Gulf Coast Realties Corp., about 2½ miles northwest of Sunniland, Collier County.

A new location has been made by Humble in Collier County. This is the "E" 1 Gulf Coast Realties Corp., about 16 miles northwest of Sunniland, which will further test the producing trend of the Sunniland area.

Summary

During 1948 exploration activities in Florida compared most favorably with such activities in 1947. There were 25 wells drilled, 3 of which were completed as producers, by Humble in the Sunniland field as follows:

10 Gulf Coast Realties Corp., 1 mile north of Sunniland, total depth 11,574 ft.

13 Gulf Coast Realties Corp., 2 miles northwest of Sunniland, total depth 11,572 ft.

"B" 1 Lee Tidewater Cypress Lumber Co., 4 miles northwest of Sunniland, total depth 11,588 ft.

The total production of oil from Florida from January 1, 1948, to December 31, 1948, inclusive, was 291,221 bbl. from a total of eight wells, five of which were flowing and three pumping. The accumulative total of oil produced from 1943, the discovery year, to December 31, 1948, 650,830 bbl.

Since January 1, 1949, an additional producing well has been brought in,

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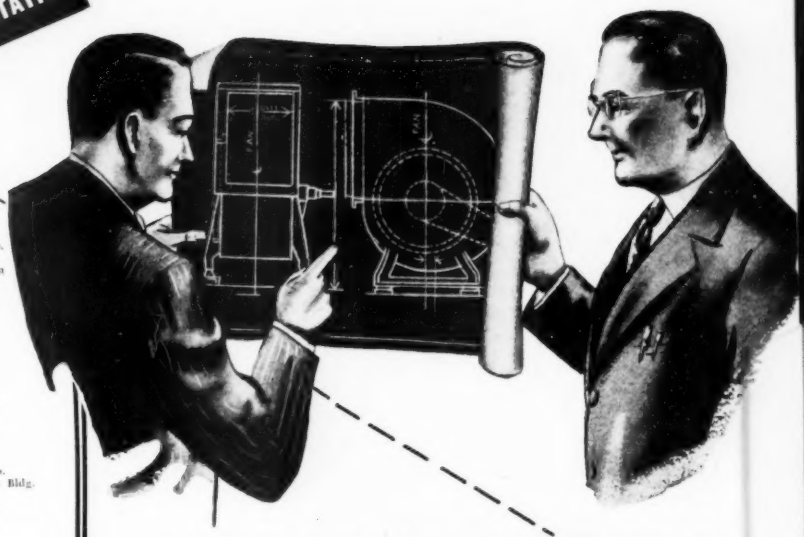

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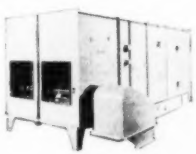

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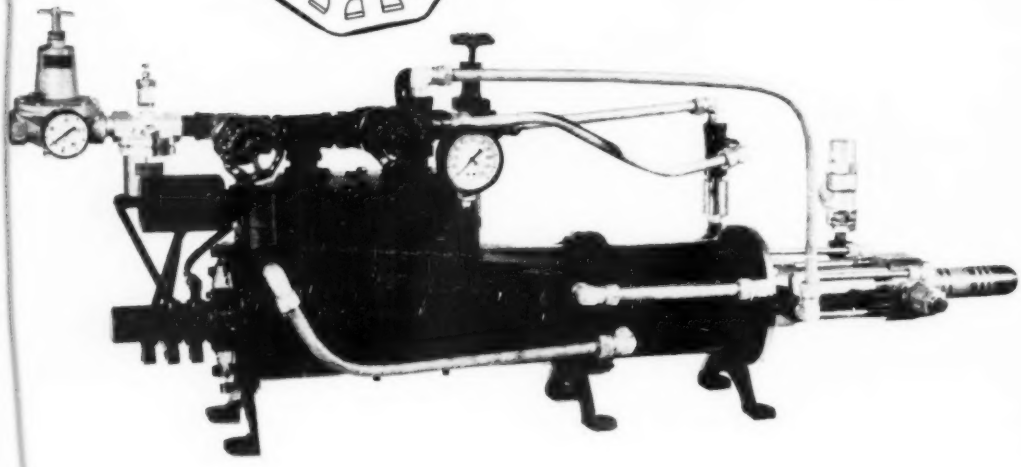

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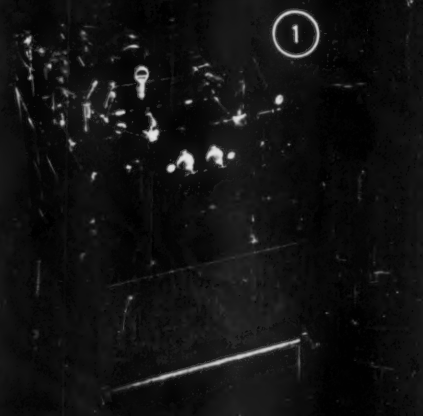

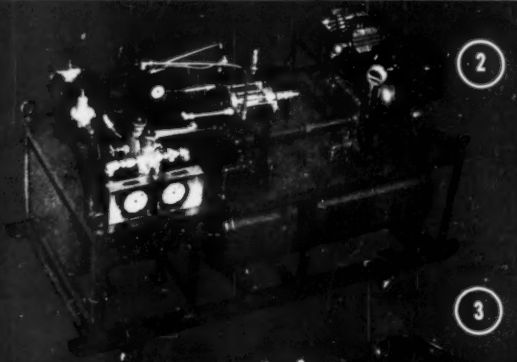

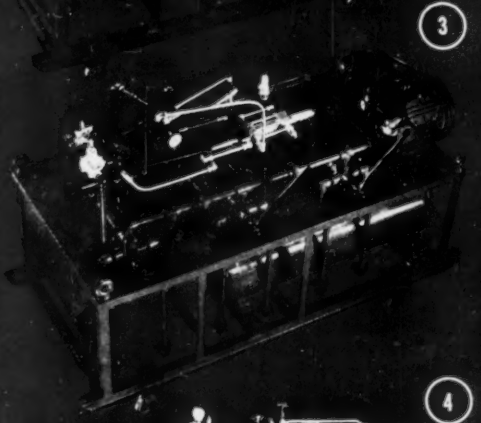

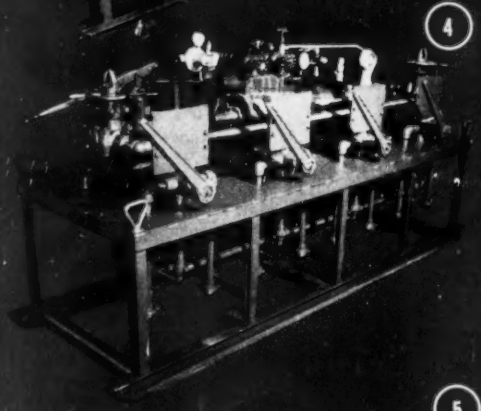

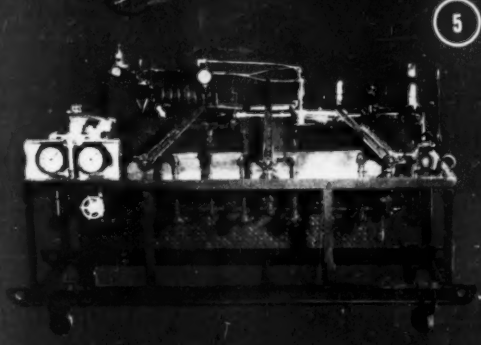

(1) Blowout Preventer operating unit with two McFarland Pumps, fluid tank, air compressor and motor compressor unit built for operation of a 6 to 9 valve manifold.

(2) A custom-built McFarland Unitized Blowout Preventer Operating Unit designed to operate one Hydril and two Cameron QRC's for a major operator. Unit includes pump, fluid tank, motor compressor unit and control valve.

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(4) Four safety devices are operated and controlled by this McFarland Blowout Preventer manifold. The unit contains the McFarland Pump, fluid tank and 4-way valves. Air supply furnished by auxiliary units on rig.

(5) This unit was custom-built for control of one Hydril and four other safety devices.

These Manifolds were built to meet the customer's requirements for control of one or more safety devices. When completely unitized, it is necessary only to make electrical connection and connections to B.O.P. hydraulic lines. When air or gas is available on the rig from other sources, it is not necessary to purchase unitized units. When making inquiry, please specify number and type of safety devices to be operated, also kind of electrical current available.

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the "B" 2 Lee Tidewater Cypress Co., 4 miles northwest of Sunniland, thereby increasing the number of flowing wells to six. Production figures for 1949 are available for only January and February but these bring the cumulated total to March 1, 1949, of 721,142 bbl. It might well be that continued drilling in the Sunniland area of Collier County will result in increasing the oil production.

Georgia: Early Prospecting

Georgia seems not to have received as much attention as Florida, in the matter of possibility of oil or gas, if records available to the writer are an index. From a report[1] by the Georgial Geologic Survey issued in 1919, it is learned that the first attempt at drilling for oil in that state was in 1905 by Capt. A. F. Lucas, 3½ miles southwest of Louisville in Jefferson County. This well ultimately reached a depth of 1,143 ft., encountering crystalline rock, and abandoned.

Another attempt was in Wayne County in southeast Georgia, drilled apparently in 1905. This well was drilled by a group organized in Savannah and was abandoned at a depth of 1,901 ft.

Some years elapsed before a prospect was drilled by Waycross Oil & Gas Co., about 10 miles south of Waycross. This well reached a depth of 3,040 ft. before being abandoned in March 1918.

From 1918 to 1938 or for a period of 20 years there apparently was no very active prospecting in Georgia. However, from 1938 through 1948 there were 36 wells drilled in 19 different counties all in southern Georgia within the Coastal Plain Province.[2]

Only a very limited number of deep tests have been drilled in Georgia. The 36 wells recorded in the statement by Dr. A. S. Furcron ranged in depth as follows:

From 345 to 1,000	4
From 1,000 to 2,000	7
From 2,000 to 3,000	1
From 3,000 to 4,000	8
From 4,000 to 5,000	10
From 5,000 to 6,000	3
From 6,000 to 7,000	1
From 7,000 to 7,500	11

Some of these tests penetrated the entire sedimentary section while others terminated well within it. It is recorded by Furcron that 4 terminated in the Eocene, 1 in the Upper Cretaceous, 6 in the Lower Cretaceous, 1 in the Triassic, 4 in the Paleozoic, and 20 in descriptive materials which omitted information as to age.

From a glance at the map of southern Georgia and Florida, it readily will be apparent that prospecting has been confined to the Coast Plain portion of the state. Obviously, therefore, the southern half of Georgia is considered the best prospective area. From Columbus on the west to Augusta on the east through Macon is the dividing line between the crystalline area to the north and the sedimentaries or Coastal Plain area to the south. It is this southern half of Georgia that contains sedimentary rocks of varying thicknesses. The results of the drilling in the past few years have revealed greater thicknesses of sediments than heretofore considered present and this new concept of the formations has apparently caused greater consideration to be given to the southwestern portion of the state.

While much additional light has been shed upon southern Georgia and northern Florida through recent prospecting, many of the data have confused rather than clarified our thinking about the pre-Cretaceous sediments. It does mean, however, that we are indeed given the opportunity of learning more from every well drilled and that gradually the details that now trouble us will be unraveled.

Studies of the cuttings and cores from wells drilled in the recent past have definitely proved the unquestioned presence of unaltered Paleozoic rocks at varying depths beneath the surface in southern Georgia as well as in Florida.

Current Activities

There were three wells completed in Georgia during 1948. Since January 1, 1949, three wells have been begun in Georgia all in the southern tier of counties bordering Florida. These are as follows:

Echols County, Humble Oil & Refining Co., began March 23, 1949.

Seminole County, Mont Warren, began February 14, 1949, completed March 24, 1949—3,554 ft.

Brooks County, D. E. Hughes, began March 23, 1949.

Alabama: Early Prospecting

From records contained in reports of the Alabama Geological Survey, it is learned that in 1841 while dredging operations were in progress deepening the Tombigbee River and removing the McGrew Shoals near old St. Stephens, in Washington County, quite a quantity of crude oil was found and collected[3]. Furthermore it is recorded by Semmes that the first drilling for oil in Alabama was in 1865 when the Watson wells in Lawrence County, northern Alabama, were completed. There were apparently more than two wells begun because the account says: "Jonathan Watson, Esq., of Titusville, Ind., drilled wells in Alabama in 1865, and got oil in two of them." Many years passed and only a few wells were completed before the Goyer wells Nos. 1, 2, 3, 4 were drilled in 1890 and 1891. Excellent shows of gas and oil were reported from the 1 Goyer but the well was not developed into commercial production.

First Commercial Production

From this early beginning Alabama has continued to interest prospectors and from available records a total of at least 501 wells have been drilled during the nearly 84-year period from 1865 to April, 1949.

The first commercial production of oil in Alabama came on February 12, 1944, when Hunt Oil Co. brought in its 1 A. R. Jackson at Gilbertown, Choctaw County, southwestern Alabama. The producing zone was from a depth of 2,575 to 2,585 ft. in the Selma chalk of Cretaceous age. When first brought in the well flowed at the rate of 30 bbl. per day of heavy, asphaltic-base, 17.4° A.P.I. gravity oil. Prospecting has been largely confined to the Coastal Plain region of Alabama since production was found at Gilbertown. The number of wells in Gilbertown field (13 in East Gilbertown and 21 in the West Gilbertown) now total 34. Production is from the Selma chalk and the Eutaw sand. The field has a daily production of about 1,245 bbl., which is transported by pipe line to a terminal on the Warrior River and then by barge to the Placid Oil Co. at Tuscaloosa where it is refined. The total production for the calendar year 1948 was 465,241 bbl. Production during January, February, and March 1949 amounted to 113,265 bbl.[4]

Deepest Well in Three States

On June 26, 1948, Humble began its 2 J. R. Williams test in 21-6n-4w, about 6 miles west of Chatom, Washington County, sonthwestern Alabama. Washington County adjoins Choctaw County on the south and this test was therefore watched with more than usual interest because of its proximity to Alabama's only producing field. It was drilled "tight" and details are not available but the depth exceeds that of Gulf well on Big Pine Key, southern extremity of Florida by 204 ft. The 2 J. R. Williams was completed February 8, 1949, at the impressive depth of 15,659 ft.

Major Development

The outstanding development in addition to the completion of the deep test by Humble was the public announcement of the big salt dome about 40 miles north of Mobile in Washington County, near McIntosh. It is reported that this dome has a width of 2 miles and comes to within 400 ft. of the surface.[5]

Leasing Activities

While Gilbertown field still remains the only one in Alabama the leasing activity is still reported to be brisk. Statistics as to acreage under lease are not available to the writer but from all accounts there is great activity.

Laws Regulating Development

Alabama, Florida, and Georgia each have laws regulating prospecting and providing conservation and protection of the developers of oil and natural gas. The laws now effec-

(Continued on page 351)

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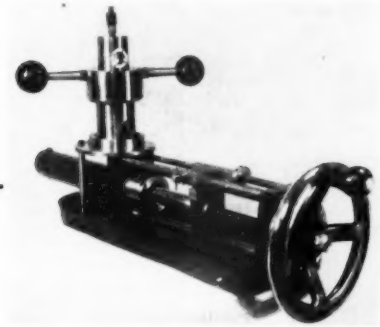

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Panel of Experts Discuss Trends in Gulf Coast

The accompanying reports represent highlight material given in addresses before Monsanto Chemical Co.'s recent symposium held at the Shamrock Hotel, Houston, in connection with the dedication of Monsanto's new petrochemical plant at Texas City. Richard J. Gonzalez is petroleum economist with Humble Oil & Refining Co., Houston; W. J. Murray, Jr., is chairman of the Texas Railroad Commission, Austin; and Paul Weaver is chief geophysicist, Gulf Oil Corp., Houston.

R. J. GONZALEZ

W. J. MURRAY, JR.

PAUL WEAVER

Gulf Coast Most Promising United States Oil Reserve

by Richard J. Gonzalez

THE future of petroleum is of particular concern to the Gulf Coast, for this resource is a major factor in the economy of the area. The strip of land extending about 100 miles inland from the shore line along the Gulf of Mexico already has more than one-fourth of the presently known reserves of oil and gas in the United States. Including the potential resources of the Continental Shelf, the states adjacent to the Gulf of Mexico constitute one of the most promising areas in this country for future discoveries of petroleum.

The proved oil and gas reserves of these states (Texas, Louisiana, and Mississippi) are two-thirds of the total in the United States. In 1948 the production of this region was at the rate of about 7 per cent of the liquid petroleum and 3 per cent of the natural-gas reserves, compared with average rates of withdrawal in the other states of 10 per cent for petroleum and 5 per cent for gas.

Outlook for Gulf Coast Hydrocarbons

The general prospects for domestic petroleum suggest a promising outlook for the hydrocarbons of the Gulf Coast. The oil resources of this area have already been developed to a high level, but natural gas is in the early stages of important expansion which will lead to larger markets and much better prices. The output of liquid fuels from the Gulf Coast is expected to increase moderately for the next few years, assuming full opportunity and reasonable success in exploring the potential resources of the Continental Shelf. The development of gas operations is expected to be rather rapid and of great economic significance.

The Gulf Coast and Panhandle-Hugoton are the two major areas in which gas reserves are concentrated. The latter area serves primarily the central portion of the United States, and already has a large part of its supplies committed to that market. The Gulf Coast, being further removed from the large population centers, lagged somewhat in finding markets for its gas until recent years. During and since World War II there has been a rapid industrial development along the Gulf Coast, based in large part on the availability of hydrocarbons, and several new lines have been built and authorized to move natural gas northeast. As coal and oil prices have advanced, an extraordinary demand for gas has developed because it is economically attractive to construct gas pipe lines to the East Coast, the Midwest, and the Pacific Coast. This demand adds value to the gas resources of the Southwest.

The economic importance of gas to the Gulf Coast has been held back only by lack of markets and low prices, for proved gas reserves have a heat value exceeding that of the known oil reserves by a substantial margin. The average price for gas at wells in Texas in 1948 was less than 5 cents a thousand cubic feet, equivalent to only 30 cents for a barrel of oil and $1.25 for a ton of coal, based on a value of 1,000,000 B.t.u. for 1,000 ft. of gas, 6,000,000 B.t.u. for a barrel of oil, and 25,000,000 B.t.u. for a ton of coal.

In 1948 the price of fuel oil at the Texas Gulf Coast was $2.45 a barrel, and the price of coal at Pennsylvania mines was about $5.00 a ton, so that these fuels commanded from four to eight times as much as gas for the same heat value at the point of production. The delivered cost of fuels to consumers is affected, of course, by the cost of transportation. It costs several times as much to move energy in the form of coal by railroad as in the form of natural gas by pipe line, and the cost for gas is several times as much as for oil. Even allowing for the cost of transportation to Eastern markets, gas in Texas has been selling at a low price relative to coal and oil.

The price of gas varies widely from less than 3 cents per 1,000 cu. ft. for sour gas in West Texas and the Pahhandle to more than 6 cents for same sales in East Central Texas and on the Gulf Coast. In Houston-Beaumont area the realization on sale of gas and on the liquids extracted from it at leases averaged about 6 cents per 1,000 cu. ft. of gas sold in 1948, compared with 3.8 cents in 1945, according to tax reports on gas, as the lower average value for gas sales alone was raised substantially by the liquid products. The report of Texas Eastern Pipe Line Co. indicates that it paid an average price in 1948 of 6.5 cents per 1,000 cu. ft., measured at 15.025 lb. pressure, for gas purchased in East Central Texas and the Gulf Coast. In some recent contracts, gas on the Gulf Coast has sold for 10 cents per 1,000 cu. ft., and some buyers are finding it necessary to bid more than that to secure additional new supplies.

It is not unreasonable to expect that within the next few years natural gas on the Gulf Coast will command a price of 15 to 20 cents per 1,000 cu. ft. at wells. A price of gas of 20 cents per 1,000 cu. ft. delivered to nearby industrial users would still be attractive compared with the present low price of $1.35 a barrel for fuel oil. Incidentally, such a price would be about what large industrial firms in the Houston area paid for gas in 1926, when the price of fuel oil averaged $1.45 a barrel at the Gulf Coast. Such field prices would also permit large lines to move gas to the East Coast at reasonable delivered prices considering its advantages over coal and oil.

At a liberal figure of 1.4 cents per 100 miles to cover all transportation costs, taxes, and profits on 1,000 cu. ft. of gas, a 1,500-mile line could pay about 20 cents for gas and deliver it at the end of the line for 40 cents per 1,000 cu. ft., equivalent to prices of $2.40 for fuel oil and $10.00 a ton

for coal. Distribution costs would mean somewhat higher prices to consumers. Industrial users probably would be able to buy gas below the average delivered price, however, so that they might pay only a small premium, if any, over prevailing oil and coal prices on the East Coast. In any case, there should be a large market for gas for home heating and special industrial uses even at premium prices relative to coal, because of the convenience and assurance of supplies.

Favorable Future Outlook

The hydrocarbon resources of the Gulf Coast are extremely valuable and will become even more important to this area in the near future. It is likely that their production will continue to increase, and that their prices will advance relative to commodities generally, particularly in the case of natural gas. Ample supplies of oil and gas are in sight to provide a basis for continued industrial expansion in the area, and in addition large markets elsewhere in the United States can be served to the extent that prices in keeping with the intrinsic value of these fuels can be realized.

Conservation is of great importance in view of the prospective demand for hydrocarbon fuels, and the efforts of operators toward that end should be encouraged by proper support of government agencies. A better price for gas will be the strongest incentive to the fullest conservation that can be attained economically. An intelligent understanding and handling of the problems and opportunities that exist should enable this area to capitalize on the bright economic outlook ahead for hydrocarbon resources.

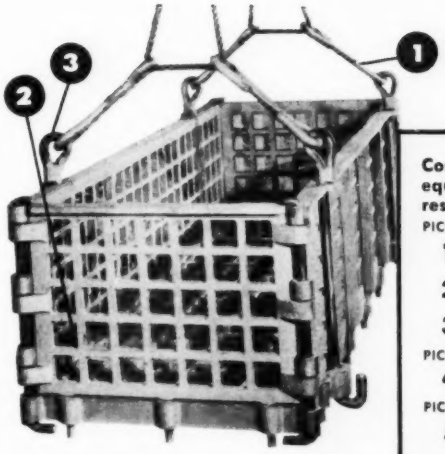
Natural-Gas Resources In the Gulf Coast

by William J. Murray, Jr.

NATURAL gas is a petroleum hydrocarbon. While many discussions often deal only with liquid petroleum hydrocarbons, the total energy content of the gas reserves of the nation and of Texas, however, is greater than the total energy content of the liquid petroleum hydrocarbon reserves of the nation and of Texas respectively. Furthermore, developments in hydrocarbon synthesis have opened vast new and valuable fields of use for natural gas. Its relegation to the field of a low-cost space heating and power generating fuel has been eliminated. From dry methane, we can now make motor fuel and numerous chemicals.

One-Half of Texas' Gas in Gulf Coast

Of the estimated approximate 170 trillion cubic feet of proven recoverable reserves of the nation, over half



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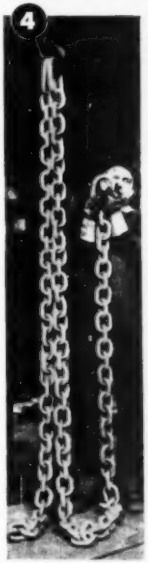

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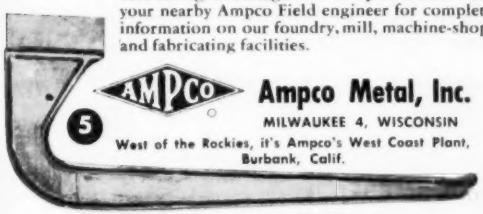

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lies in Texas. Furthermore, over half of Texas' proven reserves lie in the Houston and Corpus Christi Railroad Commission districts. In the Houston and Corpus Christi districts, which would probably be considered the Texas Gulf Coast region, there exists, therefore, over one-fourth of the nation's reserves of natural gas.

Our present rate of production of natural gas divided into our estimated proven recoverable reserves gives a total life for the nation of approximately 37 years. The same considerations which we have applied to the predicted life of our oil reserves must also be made to the anticipated life of our gas reserves. The rate of consumption of natural gas is rapidly increasing in the nation. It approximately doubled during the last 10 years. If this rate of increase continues we would materially reduce the 37-year life if there were no additional discoveries. However, we will certainly continue to discover additional gas reserves at rates which I cannot hazard to predict.

Although some allowance must be made for varying bases of estimates of the past, there appears little doubt that so far consumption has never matched rate of discovery and we are still finding gas faster than we are consuming it. However, again we must inevitably realize that there is a limit on the total quantity of gas which can be found in the United States and there apparently rests no limit upon the nation's ultimate consumptive demand for gas except supply.

New Gas Conservation Projects

Although we have not experienced as serious an underground loss of gas as of oil, there has been a very serious aboveground wastage of gas through flaring. Recently there has been a conserted effort on the part of industry and the regulatory bodies to reduce to the lowest practical minimum this wastage of flare gas. A construction program of gas-conservation projects initiated since the war is under way in Texas involving the utilization of 2¼ billion cubic feet of gas previously flared. The projects in the Gulf Coast area, either completed, under construction, or in the planning stage, involve 850 million cubic feet.

This conservation program will add considerably to the life of our natural gas reserves. Likewise there are considerable volumes of gas being consumed for what I believe most engineers would agree are inferior uses for this superb fuel and hydrocarbon raw material. It is not my purpose to analyze or condemn these inferior uses here but in passing to comment that the pressure of economics will probably soon eliminate much of this inferior use and thereby further increase available reserves for the relatively superior uses.

In summary then, oil and natural gas comprise Texas' most valuable natural resource. They are found in rich abundance in the Texas Gulf Coast and because of the advantage of shipping, fresh water, salt, and sulfur also located in this region, they give promise of a vast industrial development. This industrial development will be the very backbone of the economic structure and prosperity of the state.

Estimation of Oil, Gas Reserves in Gulf Coast

by Paul Weaver

PURPOSE of this discussion is to give a brief history of the various estimates which have been made of oil and gas reserves, and to describe how calculations of these estimates are now being made. Estimates made during past years have always been far too low, in the light of subsequent production, and this discrepancy has served to raise doubts as to the value of any kind of estimate, but the present methods differ from earlier ones, and have a definite value, albeit they are conservative in that they concern only oil and gas already located.

Early estimates, as well as those being made annually now by the American Petroleum Institute and the American Gas Association, were predicated on a consideration only of those lands which were actually producing at that time, and gave no figures for any land which had no oil and gas production prior to the time the estimate was made. Therefore, the estimates which have been made in past, and the most recent one for December 31, 1948, do not take into account as proven reserves the oil and gas to be discovered in future fields, although the history of Texas and Louisiana is that new fields have been discovered in new areas as drilling extended out from formerly known fields, and that there has also been the discovery of more oil in these latter.

The fundamental difference between estimates made prior to 1935 and those which have been made since, is the difference in method of calculating the oil and gas underground from the information obtained during the drilling of the wells, and during their early production history. Up to that date, there was very little effort made to estimate the amount of gas with the oil.

Volumetric Method of Estimation

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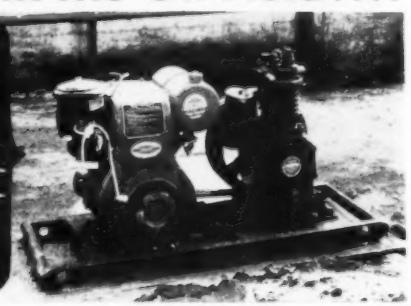

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a consequent lowering of the pressure of the gas remaining. Because gas is very mobile, the change in pressure extends to the entire body of the deposit, so that if there are several wells which are producing and another well which is not producing, we can measure this decrease in pressure in the well which is not producing. Since the laws of the expansion of gas are well known, the drop in pressure is observed, and the amount that has been taken out is measured, it is possible to calculate the original body of gas at any desired pressure if we know the original pressures, assuming that the external boundaries of the area in which the gas existed are not changing in the meantime.

In the case of oil fields where there is not only oil present as a fluid underground, but gas and water, the presence of these other fluids complicates the calculations of the oil, but the same general principle of determining the original volume by knowing the change in pressure with the production of a known quantity of the various fluids is applicable. However, in the case of many oil fields, the volume occupied by the fluids which are being produced is not constant, but is decreasing because water is pushing in to replace oil and gas and water removed, and the field in this case is said to be under water drive. In other fields where the volume remains fixed, the field is said to be under a gas drive, or under an expansion drive. Cases where both forces are effective are known.

The situation, therefore, is that today if we have a sufficient number of wells to show a regularity in underground geological conditions, and if we have a production history of some months or years, depending upon the complexity of the situation, we can calculate back from the production information and the well information the volume which originally existed underground. By subtracting the amount of oil, gas, and water which has been produced, we can calculate the amount of oil which can be recovered in the future, assuming recovery to be 100 per cent efficient. It is by the use of these data that we now make our estimates of future oil reserves.

Oil and Gas Reserves

These estimates which are published annually for the United States, for crude oil, natural-gas liquids, and natural gas, are itemized by states, as of December 31 of each year. For January 1, 1949, the figures for Texas were: 12,484,218,000 bbl. of crude oil, for natural-gas liquids 2,074,674,000 bbl., and for natural gas 95,708,553 million cubic feet. The total amount of liquids for Texas, therefore, was 14,558,892,000 bbl.

The increase in reserves of crude oil and natural-gas liquids in Texas during 1948, was 1,820,322,000 bbl., and the production during that year in Texas was 993,030,000 bbl., so that the production was only about half of the increase in reserves—in other words, during the past year, we discovered in Texas twice as much oil as we produced in the state.

In natural gas, the figures for Texas are equally encouraging. In 1948, we added to reserves 8,393,357 million cubic feet, and we produced 2,710,422 million cubic feet, so we added to reserves during last year three times, approximately, what we produced. Therefore, as to the immediate situation in 1949, compared to last year, we are certainly better off in Texas as to reserves.

In Louisiana, there is a similar picture, so that the reserve position in the two coastal states is a very satisfactory one.

Offshore Drilling

(Continued from page 213)

to be the most popular drilling method utilized. In the majority of operations the L.S.T. (or Y.F. barge in some cases) is towed to the drilling site, but Pure Oil Co. is using a self-propelled L.S.T. Several operators continue to use a platform with all drilling equipment mounted thereon.

During the year Superior Oil Co. started fabrication of the two largest offshore drilling platforms yet built. An outstanding feature of these structures is the fact that they will be 100 per cent salvable. An indication of the immensity of the structures can be gained from these facts: (1) The deck area of each approximates 1 acre. (2) Each installation will involve approximately 600 tons of structural steel, 1,650 tons of tubular products, and over 200,000 board feet of lumber. The main platform (each structure consists of two platforms) will be 126 by 172 ft. with space for the drilling of one vertical and four deflected wells. The drilling rig will be capable of going to 20,000 ft. with 4½-in. drill pipe.

A radically different type of structure for drilling in the unprotected waters of the gulf has been recently put to use. It can best be described as a "stabilized sea drill" and is a joint venture of Barnsdall Oil Co., Seaboard Oil Co., and Callery & Hurt, with Barnsdall as the designer and operator. In brief, the drilling equipment is supported by what might be called a floating-pile foundation. The piles are attached at their base to a large barge which, when flooded, causes the entire structure to sink to the ocean floor. Stability during flooding is provided by two large adjustable "outrigger" pontoons on each side of the structure.

The entire structure, with drill equipment aboard, weighs 1,120 tons. Drilling rig to be used is the Emsco Derrick & Equipment Co. J-1600 which has a rated depth capacity of 16,000 ft. with 4½-in. drill pipe. The stabilized sea drill is currently on its first location in the Breton Sound area off the Louisiana coast. It is 18 miles from the mainland and 5 miles off Breton Island.

The primary motivation behind the development of the Barnsdall et al. drilling barge has been economic—to reduce the cost of offshore drilling. It is expected actually to cost less than conventional piling platforms in the same depth of water (18-22 ft.). In addition, and of primary importance, is the fact that it will be 100 per cent salvable. At the completion of a well, the water can be pumped out of the barge, thus floating the entire structure in readiness for towing to another location.

Shell Oil Co., Inc., drilled an offshore well near Pass a Loutre, Louisiana, using a barge designed for swamp and inland water drilling. Special measures were taken to adapt the swamp barge for an offshore operation. First a shell fill was deposited on the ocean bottom to reduce the water depth to a point where the barge could rest on bottom. Secondly, war-surplus landing craft (L.S.M.'s) were sunk as breakwaters to minimize wave action.

In efforts to drill as many wells as possible from one location, some extremely high angles were obtained with directional holes in the gulf. Magnolia Petroleum Co. attained an angle of 57½° in drilling a test into a salt dome some 35 miles out in the gulf from the mouth of the Atchafalaya River, Louisiana coast.

Allowables for Offshore Wells

Last September, the Louisiana Department of Conservation granted special higher production allowables for wells in the Gulf of Mexico. A separate depth bracket scale from that used for land wells was set up. A 2,000-ft. offshore well is allowed 265 bbl. daily compared to 76 bbl. daily for a well of the same depth on land. The scale ranges up to 675 bbl. daily for wells of more than 13,000 ft., compared to 410 bbl. for such wells on land.

Deepest hole drilled to date in Gulf waters is the Kerr-McGee Block 28 well in the Ship Shoal area off Terrebonne Parish, Louisiana. The test reached 14,451 ft. with good gas shows at about 7,600 ft. and 8,600 ft. Electric log and core data indicated a gas-condensate zone at 13,973-14,045 ft. Drilling difficulties and bad weather caused the operator to lose the lower 7,400 ft. of hole. Seven-inch casing has been cut and pulled to 7,164 ft. from which depth the hole will be redrilled.

All of the Gulf of Mexico exploratory work, to date, has been confined to the water off the Louisiana and Texas Coasts. No operator has

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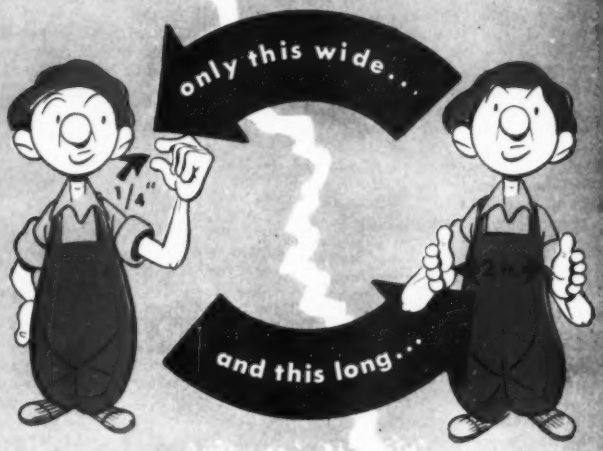

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yet ventured into the shelf area off the Mississippi, Alabama, and Florida coasts. However, 800,000 acres have been leased off Florida and exploration work has been extensive offshore from all three states.

Leasing of Louisiana and Texas has been confined to a belt 31.4 miles wide. Louisiana claims territory only out to this point. Texas, however, lays claim off its coast to the entire area within the limits of the Continental Shelf. The Continental Shelf is 140 miles wide at the Texas-Louisiana line.

The high annual rental charged by Louisiana for its offshore leases has been the primary incentive for a good part of the offshore activity now under way. Annual lease rental is one-half of the bonus paid when the lease is originally obtained. The competitive bidding on offshore leases has resulted in some large bonuses. Superior Oil Co. paid $515,000 bonus for mineral rights on a 5,000-acre tract about 25 miles offshore in the West Cameron area. Hence, Superior's annual rental on this one lease is $257,500, and this company has an additional 125,000 acres under lease.

Louisiana has granted far more offshore leases than Texas. At the present time, in fact, Louisiana has six times more acreage under lease than Texas. Texas has held only one offshore sale, and this was in November 1947. Bascom Giles, land commissioner for the state, attributes this comparative inactivity to two factors. The most important is the government tidelands suit against the state. While the board feels that it might receive some fairly good bids for offshore leases, it is sure that once the

ALL-TIME SUMMARY OF OFFSHORE OPERATIONS

State of Louisiana
- **Kerr-McGee Oil Industries, Inc.—9 wells (4 prod., 2 drlg.-loc., 3 abd.)**
- **Magnolia Petroleum Co.—14 wells (2 prod., 6 drlg., 6 drlg.-loc. 6 abd.)**
- **Humble Oil & Refining Co.—21 wells (5 prod., 16 drlg.-loc.)**
- **The Texas Co.—9 wells (3 prod., 3 drlg.-loc., 3 abd.)**
- **California Co.—3 wells (1 prod., 1 drlg., 1 abd.)**
- **Superior Oil Co.—4 wells (2 prod., 2 drlg.)**
- **Stanolind Oil & Gas Co.—2 wells (2 drlg.-loc.)**
- **Barnsdall Oil Co.—2 wells (1 prod., 1 drlg.)**
- **Pure Oil Co.—2 wells (1 drlg., 1 abd.)**
- **Shell Oil Co., Inc.—4 wells (1 prod., 1 drlg., 2 abd)**

State of Texas
- **Humble Oil & Refining Co.—7 wells (7 abd.)**
- **British American Oil Producing Co.—3 wells (3 abd.)**
- **Melben Oil Co., Ohio Oil Co. and Benedum-Trees—1 well (abd.)**
- **Ohio Oil Co., Melben Oil Co. et al 1 well (loc.)**
- **Tidelands Oil Corp. and Superior Oil Co.—1 well (abd.)**
- **Stanolind Oil & Gas Co.—4 wells (3 drlg.-loc., 1 abd.)**

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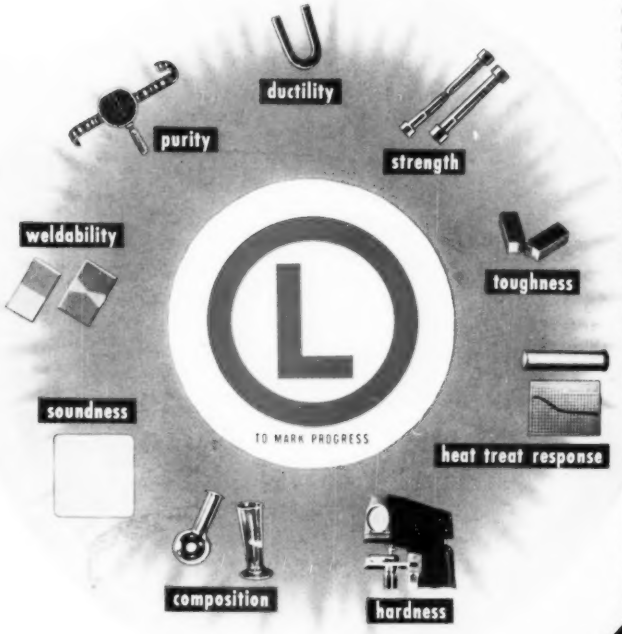

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cloud on the title has been removed these same leases will likely bring a much better bid.

The second factor is the restriction now in effect on geophysical work in offshore areas. At present, a company cannot conduct exploration work except in areas which it has under lease. To alleviate this situation, a bill permitting exploration before leasing has been presented to the current session of the Texas legislature.

Annual rental on Texas offshore leases is much lower than that of its neighboring state. Rates vary from $1 to $5 per acre as determined by the state land board. Primary term of Texas leases is 5 years, the same as for Louisiana.

New Control Lab

(Continued from page 230)

The analytical-experimental laboratory occupies some 1,450 sq. ft. with adequate desk and bench space for professional chemists and chemical engineers to apply their academic and industrial training to performing exacting analytical work, plant "trouble shooting," bench pilot plants, and byproducts development work. A separate balance room and cold room are also provided in this wing. A separate room has been set aside for micro and analytical equipment used for quick qualitative surveys or fine quantitative analyses of small samples.

The physical chemical laboratory has a cluster of five Podbielniak columns mounted back to back for using liquid air to distill light gases in addition to 500 sq. ft. for spectroscopic analytical equipment with a convenient darkroom. Some 350 sq. ft. are also provided in a separate room for four chemists performing catalyst analyses for Shell's large cat cracker and heats of combustion for aviation gasoline. Another separate 600-sq.-ft. room has been set aside for crude-oil evaluations made on all new wells and fields, as well as periodically on old ones to assist conservation of natural resources by increasing the efficiency of distributing and utilizing crude oil.

Developments in Florida, Georgia, and Alabama

(Continued from page 342)

tive in these states were passed in 1945, the date of approval in each state was as follows: Georgia, March 9; Alabama, May 19; Florida, June 5. Each of these laws is patterned after the laws found by practice in oil producing states to be most effective and practical. Through the Interstate Oil Compact Commission direct assistance was given Florida and Georgia in formulating the laws and the rules and regulations governing the industry.

The operation of these laws, and application of the adopted rules and regulations in each of these states has been effective in establishing orderly procedure and in conserving our natural resources not alone in preventing waste but likewise in protecting the underground waters from impairment and ruin by having each and every well plugged upon abandonment.

These states appreciate the cooperation they have received from the major oil companies and the independents who have operated and who so wholeheartedly fulfilled the provisions of the law.

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4. Figures on number of wells and production through communication from Dr Walter B. Jones, Alabama State Oil and Gas Supervisor, April 15, 1949.

5. Communication from Dr. Stewart J Lloyd, assistant state geologist of Alabama, March 22, 1949.

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This is the "remainder" of the lease site at Sour Lake field (near Beaumont, Tex.) which remains an unsolved mystery as to exact cause of the land's subsidence

Sour Lake Lease Disappearance An Unsolved Gulf Coast Mystery

THIS is the twentieth anniversary of the "Strange Case of the Disappearance of the Sour Lake Oil Lease." And it still is an unsolved mystery. Hidden beneath the murky depths of an oblong and accidental lake in Sour Lake oil field, 22 miles west of Beaumont, Tex., the situation embraced one of the deepest subsidences of land ever to occur in an oil field of this country. Within 3 days' time a mysterious undertow swallowed up a strip of land known as The Texas Co. Fee No. 4603, Brooks Subdivision, and extended onto the Gilbert lease in the field.

The phenomenon started as a spot as large as a baseball diamond—which eventually grew to 12 to 15 acres—and continued sinking virtually without warning in the producing field 2 miles from Sour Lake. Nobody, including geologists who made an intensive study of the strata and terrain, has determined the exact cause of the collapse or shifting of subterranean structures which allowed part of the field to subside into a lake and cracked fissures in the ground in an even wider radius. Various theories were advanced at the time and others have been offered since. The speculation continues.

The Sour Lake sink has been by no means the first or only freakish case of its kind, as subsidences have occurred in other oil fields and sulfur deposits before and since. Bryan Mound and Big Hill,* location of a sulfur deposit operation, and El Dorado are among the better known Gulf Coast spots marred by the collapsing of the earth's surface. Probably none was more disturbing than the drop in Hardin County in 1929.

*Big Hill, Matagorda County, Texas; not Big Hill, Chambers County.

An ordinary incident gave the only warning before the Sour Lake happening. Two oil-producing wells in the field began to pump water. Next morning members of the roustabout gang on a Texaco well and others noticed something amiss. A spot in the field, less than 100 ft. from the nearest drilling, in the words of one of the men, "wasn't where it used to be." The ground had settled slightly—still was being pulled down by some invisible force, to all appearances.

The movement was described as so gradual that it was hardly noticeable, at first. An area 100 by 150 ft.—a good-sized city lot—gave slowly way. The crew quickly moved the derrick and equipment away. Water rapidly filled the depression, and that same day trees and all vegetation on the spot began vanishing.

More than 35 wells belonging to four companies salted up and failed. On the other hand, the 89 Gilbert, west of the sink, making 8 to 10 bbl. a day, spurted suddenly to 250. But it was the only one. All the wells which went to salt water were down from 700 to 1,500 ft. Some had been producing 25 years.

By the third day the sink had attained a depth of from 100 to 160 ft., some say more, according to the best measurements and estimates at the time, and had covered its present area of more than 12 acres. The subsidence was complete. It had started at the center of the Fee strip, which was about 30 ft. in width and 1,200 ft. in length, and wiped it out.

The four oil leases affected by the movement of the earth were the Texas, the Minor, the Gilbert, and the H. M. Terry. All four companies reported many derricks thrown out of line. Most of them had to be rebuilt or braced before being put back in use.

Tubing in all wells in a radius of from 1,000 to 1,500 ft., it was recalled, was either broken or bent at a depth of between 450 and 525 ft., indicating the level of the earth's shifting or other disturbance.

Production was never restored in the affected wells. Texas Co. pumped one well as a test for 2 years but brought up nothing but salt water. Crews ripped up and moved pipe lines in the menaced zone. A new boiler belonging to one operator tilted over the edge of the big hole. A crew with tackle rushed up and saved it. A 200-bbl. tank tipped but did not go in.

Among the possible causes of the underground mishap speculated on were the following:

The sinking was the changing of cap-rock formations and oil sands.

Heavy blasting in that section to locate a dome shortly prior to the subsidence caused it.

Water in the cap rock dissolved the salts of the dome.

The dome had an "incompetent arch" which existed long before the local exploration for oil.

A cavity was created by the removal of solids, chiefly salt, in connection with oil production.

A cavity resulted from the removal of 73,000,000 bbl. of oil from the pool in the quarter century of the field's history.

Among the scientific studies made of the unusual Sour Lake case was that of Dr. E. H. Sellards, who at the time was director of the bureau of economic geology, University of Texas, and who visited the field. Dr. Sellards found that the tubing in Texas Co. well No. 150 and Terry Oil Co. well No. 1 was bent at a depth of 520 ft. Each was a little over 400 ft. from the center of the sink.

"The injury to the tubing resulted from the movement of earth presumably toward the sink," he stated in a paper presented at a meeting of the American Institute of Mining Engineers. He concluded:

"The cause of the sink will perhaps remain in some degree a matter of speculation. That such sinks may form through natural causes is obvious, Sour Lake near the crest of this dome being apparently a sink formed previous to the occupation of this region by white men. On the other hand, in view of the very large amounts of solids, chiefly salt, removed in connection with oil production it seems highly probable that the immediate cause of sink formation was the removal of solids in this way. The most probable explanation appears to be that a cavity developed in the salt body which continued enlarging until a thin, porous and probably cavernous cap rock collapsed, permitting subsidence of the overlying sediments."

Development of Texas' Oil and Gas Law

by Judge Edgar E. Townes

THE history of oil and gas law is a subject of particular interest to me, both on account of its intense importance to Texas, and to the nation at large, and now to the world; and also because I had the good fortune to see the beginning and development of the oil and gas law of Texas. I started practicing law in Beaumont in 1903. Spindletop, as you will remember, came in 1901. The first Texas cases involving real questions of oil and gas law were just ripening into the trial stage when I started to practice, so that I have had an opportunity at least to see the oil and gas law grow into what is is now.

A brief mention of a few facts of oil history may be helpful.

The earliest I know of oil in Texas is the tradition that the earliest colonists came through what is now known as San Augustine in East Texas, where there was an oil seep known to all travelers; they would stop and grease their wagons and take a bucket of oil along with them. I had a client who paid quite a handsome price for 2,000 acres of land near Village Creek in Hardin County, because he had found an old map that showed a neat little picture of an oil seep on the land; he bought the land thinking he would find the seep at his leisure. His son was a mining engineer but the old man did not consult his son.

Early Days in Oil

In the early days there were a few very shallow wells dug by hand, which produced small quantities of oil. As the oil accumulated in the well it would be bailed out in buckets. Near Palestine oil was found at about 60 ft. This was in the late 80's. I understand that recently some of these old shafts or wells have been reopened and oil again has been taken out in buckets. There were old water wells in a number of places where small quantities of oil, some of it almost like kerosine, would rise to within less than 100 ft. of the surface. Oil in more substantial quantities was discovered and produced about 1895 at Corsicana and I believe a small refinery was built at that point.

In January 1901 Spindletop field at Beaumont was discovered by the bringing in of the Lucas gusher. This well was estimated to produce about 75,000 bbl. per day. The depth was approximately 1,150 ft.—a deep well by the standards of that time. When I first began writing oil-well contracts in 1903 they required a driller to go to 1,200 ft. unless oil or gas were found sooner in paying quantities.

A short time later oil was discovered at Sour Lake at a depth of 1,800 to 2,000 ft. Then followed Humble, Goose Creek, and others. I remember that the setting of the first string of 8-in. casing at 5,000 ft. caused a great deal of comment in the newspapers. Now wells have been drilled to more than 3 miles.

From 1917 to 1920 fields at West Columbia, Electra, Burkburnett, Breckenridge, and Ranger were brought in. In 1930 East Texas came in to the surprise of most of the oil fraternity and to the amazement of the oil world on account of its size.

No Structure-Finding Science

All oil fields, I believe, which were discovered before the middle 20's were the result of locations made as a result of surface indications, such as oil seeps, gas seeps, sulfur and other bad water, paraffin dirt, etc. We had no oil or structure-finding science such as geophysics, petroleum geology, and similar scientific methods.

These early fields were produced by very wasteful methods according to modern standards. It is estimated that a very small percentage of the total recoverable oil was extracted. "Conservation" and "proration" were practically unknown terms up until the early 20's. They were later to have a great influence on our laws.

Of course there is no such thing as an isolated history of law because the law cannot exist by itself. Law involves the history of the courts, the development of people, the growth of industry, and it has to change with the changes in the times and the people; it is queer how easily it does just that.

Now, we must bear in mind that the original oil and gas law that governs these property rights was made by the courts—by the court decisions. As you know, when a court has a new question come before it, it must pass on that question under the general principles of equity and law and justice in the light of the facts that the court has at the time; that decision, if it is followed, is attacked and counterattacked, and finally stands up—becomes what we call a rule of property, and is just as much a fixed doctrine as any statute could be.

50 ✓

THE AUTHOR

EDGAR E. TOWNES

This article is based on a lecture given by the author before the South Texas School of Law. The school each year sponsors a series of 16 lectures on oil and gas law which are intended for the general information of laymen rather than lawyers. (The lecture series are apart from the regular curriculum of the institution.)

Judge Townes started his law practice in the oil-boom town of Beaumont in 1903 after graduation from the University of Texas. In 1917 he moved to Houston to draw up the original charter of Humble Oil & Refining Co. He was made director and chief counsel of Humble, and later vice president. In 1947, Judge Townes established a law firm in partnership with his son, Edgar E. Townes, Jr., and his brother, the late Maj. John C. Townes. A wide interest in civic and church affairs is evidenced by the fact that he is vice president of Memorial Hospital; vice president of board of trustees of Baylor University; director for life and vice president of Houston Y.M.C.A.; dean of South Texas College of Law; and director of Houston First Federal Savings & Loan Association.

We must also bear in mind that when these courts, back in the 50's and early 60's, began to pass on these questions of the rights of people in oil and gas, they didn't know anything about oil and gas—it was a new thing. I believe we began to have oil geologists along around 1922 or 1923 and petroleum engineers, so-called, began to come out of school along about the same time. Back of that time we didn't have either. Naturally, the chemists were working in their laboratories but chemists had not been brought into the oil business up to that time and the courts could not know any more about oil and gas than the people knew, because they had to find out from the testimony of witnesses. There were a number of different theories they had to work out, and finally they may have hit one that is wrong—the law of capture.

We have to remember that at the time that law was adopted, it was established by court decision. The courts did not know about oil and gas and it is just recently that we have learned much about it. I remember a case tried in Beaumont—it must have been 1909 or 1910—Jeff Chaison Townsite Co. vs. Gulf Production Co. A very experienced oil man who had quit the oil business and had gone into the business of manufacturing oil machinery, testi-

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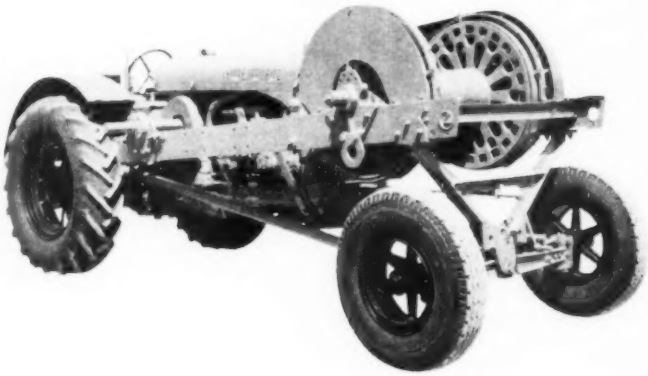

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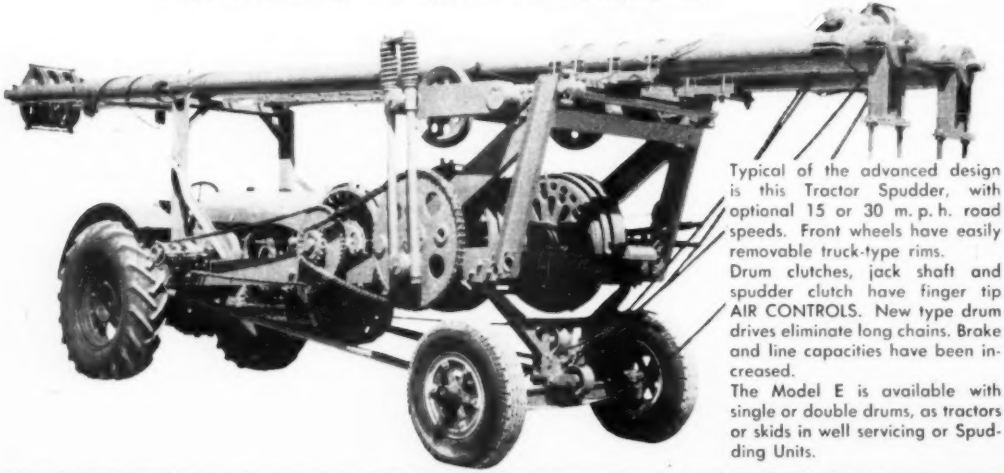

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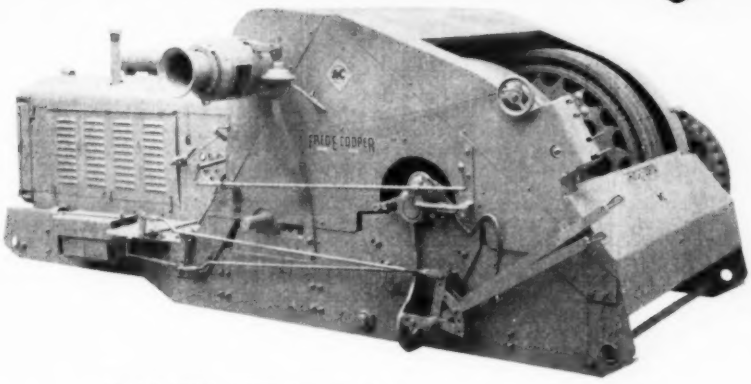

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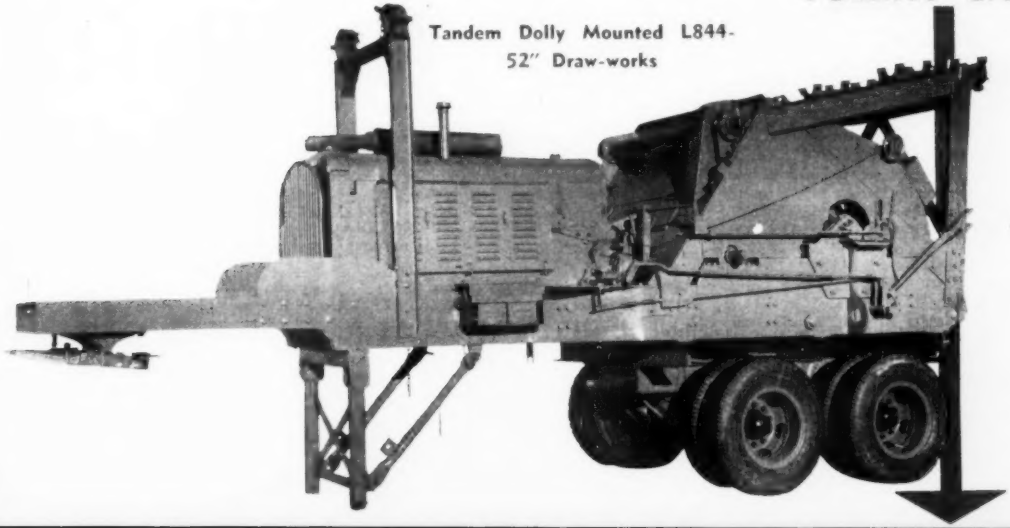

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fied on the witness stand that Spindletop was just like a house with rooms and halls and closets and doors; that if you drilled down and happened to get into a room that was full of oil, you got a gusher; if you happened to get into a closet where the door was shut, you got a duster. If you hit a hall and oil was there, you would get a well that would last a long time. That sounds foolish to us now but he was as well posted a man as was in the oil business at that time and there were a lot of queer notions.

Now you put that back about 50 years and you will see how little enlightenment the courts received in helping them to form a decision, and one can hardly blame them when somebody told them oil flowed through the earth like subterranean water and ran around free and easy like birds of the air and beasts of the field, and like wild animals. They tried to find some law to protect a man's rights in that wild animal while he was on his land, and they wound up in a conflict as might be expected.

It is interesting to know how it was worked out. Of course, the wild animal theory is that wild animals, under the common law, have always been regarded as the property of the public, but you are privileged to kill one or catch one, and then you own it. Just like fishing: Under our law, you are supposed to have a right to walk by a creek in order to fish in the creek. The oil and gas was a different thing. It was subject to private ownership. So when we hear the people criticizing this rule of capture, we must just remember that these early judges did a pretty fair job with the information they had.

I will quote briefly from a few of the decisions of some of the courts:

In HAGUE V. WHEELER, 1893, 27 Pa. 714, it was said:

"They (oil and gas) move through the interstitial spaces or crevices in the sand rocks in search of an opening through which they may escape from the pressure to which they are subject."

If you can concede the self-starting proclivities of oil and gas, that might be all right.

In ACME OIL & MINING CO. VS. WILLIAMS, 1903, 84 P. 296; 140 Gal. 681, it is said:

"Oil, on the contrary, is of fluctuating, uncertain fugitive nature, lies at unknown depths, and the quantity, extent, and trend of its flow are uncertain."

And when we come to Texas in the TEXAS PACIFIC COAL & OIL CO. V. COMANCHE DUKE OIL CO., this is what the Texas court said:

"The doctrine is well established that petroleum in its normal state is of a fugacious nature, restlessly and ceaselessly moving about in the bowels of the earth in response to the natural forces and influences which have never been fathomed or mastered by human science."

That was in 1925.

So I think the courts in the 60's could very well be dealt with leniently when we come to criticism.

As development progressed, numbers of wells were drilled and numbers of controversies arose which had to be settled in court.

For instance, "B" whose land adjoined that of "A" contended that "A" by drilling and producing a well near the division line was taking oil out from "B's" tract and should be made to pay damages therefor. In court "B" could not prove that the oil produced by "A" came from "B's" land; he could not identify the oil on account of which he sought recovery. On account of this impossibility of identification and on account of various theories, among them, the analogy to water, to wild animals, which belonged to the person reducing them to possession, the courts early adopted the rule that oil and gas belonged to the owner of the land on which was located the well through which the oil and gas was produced, and thus originated the law of capture. Some held that there was no ownership of oil and gas in place in the ground; others held there was a qualified ownership subject to being lost by migration, etc.

Rights of Owner

As a corollary the courts held that the owner of the land had the unrestrained right to produce and enjoy the oil and gas on his land subject only to the general rules regarding the use of other character of property. In other words, he could drill and produce as many wells on his land as he saw fit and could locate them according to his own choice.

The adjoining property owner was told in effect that his protection against drainage through wells on his neighbor's land was to drill such number of wells on his own land and produce them in such a way as would prevent such drainage.

When the Texas courts began to be confronted with oil and gas controversies, the law questions were novel in the state; therefore, the courts were free to reach such decisions as they thought justice and equity required.

Texas, as you know, long since adopted the common law as controlling in the absence of constitutional or statutory provision. Under the common law the owner of a tract of land owns the surface and everything below it to the center of the earth and everything above it to the roof of the heavens. The Texas courts followed the weight of authority elsewhere and adopted the law-of-capture theory of property rights in oil and gas with the rights incident thereto as established in the early decisions above referred to. These decisions, right or wrong, and the decisions following them established the property rights in oil and gas in this state and the doctrines so established have become rules of property and the basis of vested rights in Texas. In my opinion, they are not subject to change or abrogation without violation of the Constitution.

I am a little old-fashioned in my ideas. My idea is that the Constitution is supposed to protect vested rights of the people. I think some of our courts have gone a little far and twisted things around a bit; just where they are going to wind up, I don't know. For instance, I remember there was a case that went up to the higher courts—I will not say what case it was because I do not want to identify it—but after listening to the argument, one of the judges asked the question: "You say there are so many acres of productive territory in your lease; that the sand is a certain thickness; that it has a certain porosity and certain saturation, or whatever the engineers would call it, and the engineers have testified that that area under its conditions, will contain a certain amount of oil. How can you say that you have been, or are being, damaged now by what is happening on the adjoining land when the record shows you have already taken out more than that amount of oil?" If at the outset the lawyers had explained to the court the fundamental law of capture, this question would not have come up.

If you throw the law of capture out of the window, there is no answer. It must be preserved because there is no other way to run the oil business. You cannot produce oil and not know whose oil it is. The wheels of business would stop. So the rule, I think, is a very sensible one that the oil that comes out of a hole on a man's land is his, no matter where it comes from, and that is the law of capture. The law of capture is not so bad, and I believe it is the only practical rule by which to do business.

I would suggest a reading of the case of BROWN V. HUMBLE OIL & REFINING CO., 126 Tex. 296, 83 S.W. (2) 935, and 87 S.W. (2) 1069. You will find that, as is often the case, when the court is intent on some particular question it will say some things that it does not really mean. It throws out a little loose language that can afterwards be quoted, and get itself and nearly everybody else in trouble. That is what it did in that first opinion, but in the second opinion, it clarified a paragraph or two of the first decision and straightened it out. That decision deals primarily with a Rule 37 controversy, but it also restates the fundamental law of oil and gas and is important here for that reason. I think the opinion as corrected by the opinion on motion for rehearing is substantially correct, although it dodges the real question right at the last. It says a man shall have the opportunity to produce all

of the oil **to which he is entitled under the law** but it does not go on and say what he is entitled to under the law; however, it is a good decision.

I want to show you how conservation became a live subject.

Originally, oil was valuable for its lubricant qualities and kerosine that was made from it; anything lighter than kerosine was worthless. You could not put gasoline in your lamps, nor was it safe for lighting; there were no gasoline stoves. People had very little use for natural gas, so whatever gas came up with the oil, they burned. But as time went on, and particularly after the invention of the internal-combustion engines, they began to have a need for gasoline and lighter fractions of oil. The chemists got busy and found they could make a lot of things out of gas; gas pipe lines were started and shortly people began using it for cooking, heating, and lighting. They found uses for many of the byproducts that had theretofore been wasted. So there began to be an outcry against waste.

Under the police power, the state could regulate and prevent waste for the public's benefit but not for the benefit of the private individual—it does not operate that way. Then in 1917 we passed here in Texas an amendment to the constitution givi..g the legislature the duty, as well as the authority, to conserve natural resources.

Austin Meeting

At the first meeting of the Railroad Commission after the legislature passed the first conservation law, or the first law that gave to the Railroad Commission jurisdiction over oil and gas production matters—in 1918 or 1919—the Railroad Commission invited the oil lawyers to Austin to talk over the situation. Practically all the oil lawyers went up to the meeting. Judge Allison Mayfield, who was chairman at that time, stated that the legislature had passed this law and had given the Railroad Commission a duty to perform in taking over some jurisdiction in oil and gas matters, but that he and the other members of the commission realized that there was very grave doubt as to whether the law was constitutional. "As a matter of fact," he said, "I understand most of the lawyers think it is not constitutional; they think it is void, but we are not asking the oil fraternity to agree on that." He then said he knew they could be helpful by cooperating and working with the oil industry and if the oil industry saw fit to accept their offices in that spirit, then all would go along together and work out some of the problems, and perhaps they could help us. I remember well that practically every lawyer that had anything to say in that meeting prefaced his remarks with "Of course, we all know this law is void, but we are glad to go along." I daresay there was not a district court in the state at that time that wouldn't have held that law unconstitutional.

Under the police power, and the constitutional authorization, the legislature has passed these various conservation statutes and they have been tried in all of the courthouses of the state, practically all the way up and every conceivable question has been raised. Sometimes they were settled right and sometimes they were settled wrong, and the court would have to back up and start over again, but if you read the case of E. C. MARRS VS. RAILROAD COMMISSION (177 S.W. 2nd 941) which was handed down in 1944, you will find one of the last expressions of the Supreme Court. That case discusses the history.

In this Marrs case the contention was being made and had been upheld by the Court of Civil Appeals that where the Railroad Commission had made an order—this happened to be a proration order—and it was challenged in a District Court, that that court could not try the question on its own account, "de novo" as they call it, and after hearing and weighing the evidence determine whether the order was reasonable, beneficial, etc., but on the other hand the court must simply look at the record and hear the evidence to see whether or not the commission had before it at its hearing the evidence which would sustain the order that it made; in other words, the District Court was to be sort of a court of appeal. The Supreme Court passed on that, by the way, saying the courts constitute the forums where a man's vested rights have to be passed on. He is entitled to have a hearing in court, not by a commission, and the courts have a right to review the orders of the commission, and if they find that the order was bad and it was not a fair order, it should be nullified. The Supreme Court upheld the judgment of the District Court and turned down the opinion of the Court of Civil Appeals.

They said, however, that the District Court was wrong in that it undertook to enjoin the Commission from making any future order to control this particular production. That destroyed the jurisdiction of the commission to take another look and grant another order if it thought it should be granted. In other words, the court is not a legislative body; it can only pass on what somebody else does. If the Railroad Commission has entered a proper order, the court says so and refuses to enjoin it. If it has entered an improper order, the court will strike down the order, but it has no authority to go a step further. That is a legislative function the legislature has delegated to the Railroad Commission. I will read from that case:

"Under the settled law of this state oil and gas form a part and parcel of the land wherein they tarry and belong to the owner of such land or his assigns. . . . and such owner has the right to mine such minerals subject to the conservation laws of this state. Every owner or lessee is entitled to a fair chance to recover the oil or gas in or under his land, or their equivalent in kind, and any denial of such fair chance amounts to confiscation. . . .

"Under the findings of the trial court the allowables as fixed by the Railroad Commission for the two areas are entirely out of proportion to the potentials thereof. They are not in proportion to the oil under the different area. It is very evident that petitioners are not being permitted to mine their just proportion of the oil. There is several times as much oil underlying petitioners' land as there is under the land in the Church-Fields area, yet those in the Church-Fields area are being permitted to mine nearly as much oil as are petitioners. As the oil is taken from the depleted Church-Fields area it is replaced by oil drained from petitioners' property. If petitioners were free to fend for themselves they could mine the oil under their land and thus prevent its escape to the adjoining area. But the orders of the Railroad Commission here complained of prevent petitioners from doing so. As a result, petitioners are being forever deprived of their property. It is the taking of one man's property and the giving it to another.

"Our Constitution authorizes the conservation of our natural resources. Article XVI, Section 59a. The authority to execute this constitutional provision in so far as it applied to oil and gas has been vested by the Legislature in the Railroad Commission of the state. Undoubtedly, in carrying out this constitutional purpose, the Commission must, as far as possible, act in consonance with the vested property rights of the individual. While our Constitution thus provides for the conservation of our natural resources for the benefit of the public, there are other constitutional provisions for the protection of the property rights of the individual. Article I, Section 17, of our State Constitution prohibits the taking of one's property for public use without adequate compensation therefor; Article I, Section 3, provides for equal rights for all men and Article I, Section 19, provides that no citizen shall be deprived of his property except by the due course of the law of the land. The Fourteenth Amendment to our Federal Constitution provides that no state shall deprive any citizen of his property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws. We need not here determine to what extent the state may confiscate one's property, or deprive him of the use thereof, without compensation, where this is necessary in order to conserve the natural resources of the state. . . . It is sufficient to point out that the trial court here found that the drainage complained of was not necessary in order to avoid waste, and that finding is supported by the evidence. It was further found that the orders of the Railroad Commission were unreasonable, unjust, and discriminatory. This Court has many times said that the Railroad Commission cannot indulge in unjust, unreasonable, or arbitrary discrimination between different oil fields, or between different owners in the same field."

Interstate Oil Compact

There is another thing in the law that ought to be mentioned. That is the interstate compact. The Federal Constitution provided that the Congress can authorize certain states to enter into state compacts. Here was Texas with one set of conservation laws and another state with other conservation laws governing. The Congress authorized the creation of an interstate compact which simply

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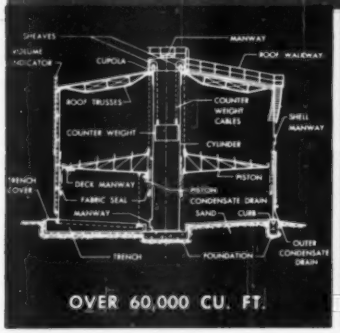

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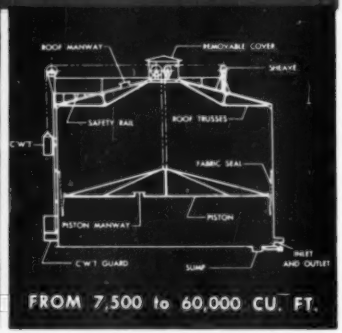

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c. A vapor balancer that can be made gas free for repairs in a few hours.
d. A vapor seal that has a life equal to that of the tank.
e. A Gasholder working pressure of ⅛ to ¼ inch of water.

2. A vapor balancer that has a 100% Dry Seal.

a. Eliminates corrosion problems attendant with wet seals.
b. Requires no heating system during freezing weather.
c. Has no evaporation loss through a water or oil seal.
d. Requires no attention, adjustment or lubrication.

3. One vapor balancing mechanism for all tanks.

a. Provides flexibility of operation.
b. Permits repair of any tank in group without affecting operation.
c. Allows vapor balancer to be removed without disturbing storage tank operation.
d. Accomplishes all venting through one master valve.
e. One structure for protection of all standing and pumping loss.

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gathers statistics as to the oil supply, probable demand, where it can be advantageously produced, and gives to the states—the oil-producing states which belong to the compact—and most of them now do—that information so that their conservation agencies can have accurate and impartial information before them in deciding what amount of oil should be produced in each state, and then the respective states can fix the state allowable and can divide it up among fields, etc., to suit themselves. The compact is purely an advisory body; it has no authority or power to do anything or make anybody else do anything.

Time will not permit going into the various conservation laws and rules and regulations of the Railroad Commission. Suffice it to say that almost everything done in the production and handling of oil and gas is now covered either by law or by order of the Railroad Commission, and if you are going to be active in such production you must familiarize yourself with all of these regulations.

Confusion in Terminology

In the oil industry, there is a confusion or ambiguity in the use of many common terms. For instance, a well producing oil in paying quantities from the standpoint of holding a lease by production means a well which produces enough oil to pay its operating expense out of the seven-eighths working interest, while a well producing oil in paying quantities from the standpoint of the lessee's obligation to drill further wells is one which has a reasonable expectation of producing enough oil to pay for the drilling, equipping and subsequent operation.

For the purpose of applying conservation rules and orders, an oil well is arbitrarily defined to be a well which produces less than 100,000 cu. ft. of gas for each barrel of crude petroleum; a well which produces more than 100,000 cu. ft. per barrel is a gas well.

To determine whether a substance coming from a well is to be dealt with legally as oil or gas we must ascertain its condition in its natural state in the reservoir. For instance, many wells produce at the surface a liquid product having the characteristics of oil. Yet if the liquid is merely a condensate form of what was gas in the natural reservoir, it must be dealt with legally as gas.

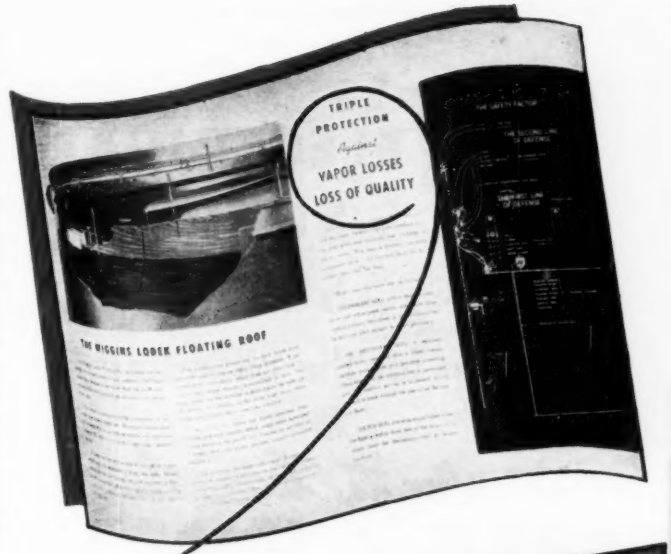
Probably more legal confusion and lawsuits have been caused by carelessly drawn royalty contracts than by any other form of instrument used in the oil business. Many such instruments are ambiguous and present serious questions: Did the parties intend the conveyance of a perpetual royalty interest or part of the royalty under a particular lease?—did the landowner intend to convey a frac-

tion of his royalty or a fraction of the entire mineral rights?—does the override apply against the working interest only, or is it to be measured on the basis of the entire eight-eighths of the production?—and many other problems. In drawing a royalty contract or a mineral-interest contract of any kind the parties must be sure that the instrument expresses their real intent. This means of course that they should get the best available lawyer to write the instrument.

Another complicating factor first came up in Ranger. That district was supposed to be sectionized. A man would lease his section, then he would sell somebody an undivided 160-acre royalty interest, then sell somebody else an undivided one-fourth of the original royalty and they would go along, some of them transferring by acres, some by fractions, and of course, when we surveyed the section, I don't suppose there was a section in the whole state that had exactly 640 acres in it. You can see the resulting confusion when you would try to get a division order that would give every man the proper amount. Then there was another difficulty: maybe they had lost some acreage by limitation. The land was not worth much prior to the coming of the oil business (about 1919 in the Ranger district) so that the people were very lax about boundaries. I remember on one occasion a company bought a site for a camp and the boys went out there to establish it. They got there and found the site purchased wasn't a satisfactory place for the camp. There was a beautiful hill about a quarter of a mile away, nice trees and grass, so they went over and built their camp there. The place that was bought for them was some distance away, but that didn't make any difference, and I suppose it was 7 or 8 years before anybody in the home office knew that the camp was not on the campsite.

Similar Incidence Elsewhere

The same thing happened at Whitepoint. A certain company had a lease on the water area opposite Whitepoint and the engineer went down and set a stake for the well location. When the boys came in with the derrick and the other machinery, there was a high tide and all of that part of the lease was mud and muck, so they picked out a nice place on the shore where it was high and dry and proceeded to drill the well and got down to about 1,500 ft. Somebody passed that way and noticed they were off of the water area. They had waited until their lease was about to expire before they started to drill, and by this time the lease had expired unless this well was on it. Of course, that man went to Austin and filed for another lease on the area water because the first company had put the well, for convenience, back on shore instead of out in the water where



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Write for bulletin FR-3 which gives further details or Wiggins Lodek Floating Roofs.

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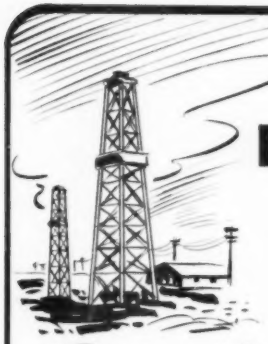

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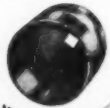

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McDowell Steel Thread Protectors provide maximum protection for your tubing, tool joints, drill pipe or casing, either in shipping, storage, field use or handling.

Threads and sizes are accurate and uniform, which make for easier, faster on or off operations.

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the lease was. Subsequent completion of the well as a dry hole settled the controversy. Those things happen in the best-regulated families, and they happen often and give rise to complications.

The oil business today is a truly complicated business from a legal standpoint. For instance, oil contracts. Originally we had only one form of contract that was more or less standard—The Oil and Gas Lease which came to be known as Producers No. 88. There are now probably 100 slightly different printed forms known as Producers No. 88 something or other. We did not have any oil payment, overriding royalty; nobody wanted a royalty unless he could get the full one-eighth; the idea of a one-ninety-sixth royalty, for instance, would not have appealed to anybody. Just like no one wanted an oil well unless it would produce enough to pay for itself in 4 or 5 days. Times have changed.

Cathodic Protection for Offshore Platforms

SEVERAL companies engaged in offshore operations in the Gulf Coast area have recently installed cathodic protection on drilling platforms to prevent corrosion below the water line. These structures represent a considerable investment, and since most of them will be more or less permanent, the necessity for protection against corrosion is fully recognized.

Leaving the corrosion problem in the spray and splash zones to protective coatings, cathodic protection controls the attack on steel below the water line, including those surfaces below the mud line down to normal piling depths. The tidal zone represents a somewhat special problem in that the functions of coating and cathodic protection will probably have to overlap in this area in order to achieve full protection.

To date, Stanolind Oil & Gas Co. has installed cathodic protection on its Louisiana State 1133 36-pile platform below Cameron Parish, Louisiana, and is contemplating similar protection of a smaller structure near Galveston. Superior Oil Co. has likewise placed one platform, for its Gulf of Mexico-State "A" No. 1, under protection and is preparing to proceed with a second in the same area. Both of these completed protective systems were designed and installed by Cathodic Protection Service, corrosion-engineering firm in Houston, using sacrificial galvanic anodes of Dow magnesium as source of protective current. In addition to the foregoing, Humble Oil & Refining Co. has in operation one or more experimental installations in the Grand Isle area, off the Louisiana coast.

WHITNEY NATIONAL BANK
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CONDENSED STATEMENT OF CONDITION
APRIL 11, 1949

ASSETS		LIABILITIES		
Cash and Due from Banks	$112,102,868.92	Deposits		$339,528,462.13
U. S. Government Obligations	142,820,820.61	Acceptances		979,013.03
State, Municipal and Other Public Bonds	14,300,482.40	Dividend Payable July 1, 1949		112,000.00
Other Bonds and Securities	402,571.81	Reserve for Taxes and Accrued Interest and Expenses		800,728.83
Loans and Discounts	84,134,981.30	Other Liabilities		44,131.15
Bank Premises	2,982,049.70	Capital Stock	$2,800,000.00	
Other Real Estate	219,136.05	Surplus	9,200,000.00	
Customers' Liability Account of Acceptances	743,505.23	Undivided Profits	5,191,016.61	
Accrued Income Receivable and Other Assets	948,935.73			17,191,016.61
TOTAL	$358,655,351.75	TOTAL		$358,655,351.75

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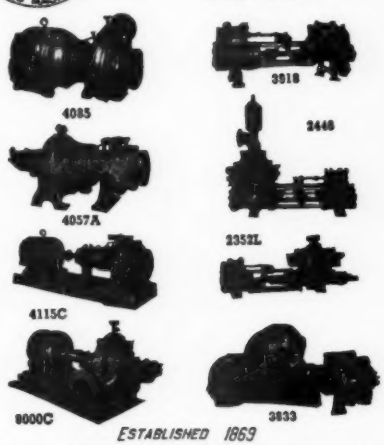

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1. A "Karbate" flexible coupling ready for assembly. Note rubber gasket covering serrations on right hand pipe, ¼" from end. Gasket lying on table will be similarly applied over serrations on left hand pipe.

2. Flexible coupling being tightened in place.

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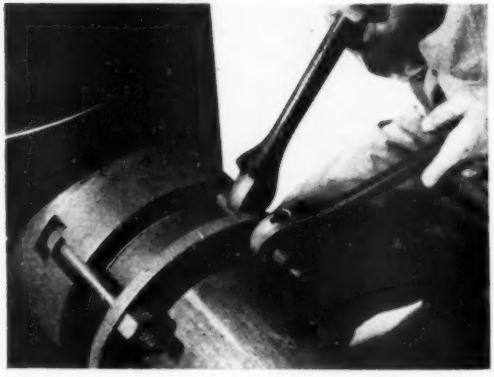

3. "Karbate" pipe being joined to gas inlet of a "Karbate" absorption tower by means of strong "Type V" flanged connection. Note flat place on bolt in foreground. This provides purchase for the second wrench to assure tightness in joint.

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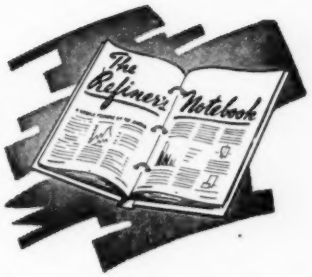

A WEEKLY FEATURE OF THE OIL ANG GAS JOURNAL

Large Motors

APPROXIMATE COST INDEXES
(1946 = 100)

Year	Electrical equip.*	Refinery† Labor	Refinery† M & L
1926	81	58	73
1928	79	57	72
1929	75	59	71
1930	70	57	65
1931	63	57	61
1932	57	48	56
1933	58	49	57
1934	61	55	59
1935	64	58	62
1936	67	60	64
1937	71	65	69
1938	69	67	67
1939	69	68	69
1940	70	69	70
1941	74	71	75
1942	79	79	80
1943	79	87	85
1944	81	90	86
1945	81	94	90
1946	100	100	100
1947	122	119	117
1948	135	‡154	‡151
1949 est.	133	‡150	‡148

*Marshall Stevens Index, Chem. Eng., Feb. 1949, p. 129. †Cost-imating No. 1, Oct. 21, 1948. ‡Preliminary estimate.

COST-IMATING No. 30 of May 12, 1949, indicated the cost of small and medium-size motors complete with line, starter, switch, and safety equipment. In Table 1 here, similar information on medium and larger size high-voltage motor installations[1] is indicated including the estimated share of the cost of incoming service feeder, incoming transformer station (if any) and circuit breaker. The labor cost of installation[1] is about equal to the material costs shown in Table 1. In Table 1 the cost of control equipment and other items is not shown for 4,160-volt motors because this cost is about the same as for the 2,200-volt motors shown in Table 1. The approximate costs of transformers[2] is shown in Table 2, and for complete 2,300/220-volt transformer installations including lines and supports is $20 to $40 per kva. to which should be added 150-200 per cent of the material cost for labor.

TABLE 2

Approximate Transformer Costs[2] (Dollars Each) but Not Including Any Auxiliary Equipment or Lines

Size kva	Voltages	Material	Labor
500	13,800-2,300	$3,120	$600
100	2,300-440	865	150
75	2,300-220	725	150
50	2,300-440-220	550	120
40	2,300-220	535	105
30	2,300-220	460	105
25	2,300-220	375	105
25	2,300-220-115	375	105
15	2,300-440-220	250	60
15	2,300-220-115	250	60
10	2,300-220-115	210	60
5	2,300-220-115	160	58
3	2,300-220-115	110	58

References

1. Kun, E., Motor-Voltage Considerations in Petroleum Refineries, The Oil and Gas Journal, Mar. 2, 1946, p. 86.
2. Author's files.
3. Happel, Aries, and Borns, Chem. Eng., Dec. 1946, p. 97.

TABLE 1—COST OF MEDIUM AND LARGE HIGH-VOLTAGE MOTORS[1] (1946), DOLLARS*

	Horsepower					
440-VOLT EQUIPMENT—	**60**	**75**	**100**	**125**	**150**	**200**
Motor—400-volt, 3-phase, 60-cycle, 1,800-r.p.m., squirrel-cage, explosionproof	851	986	1,294	1,660	1,923	2,456
Controller—440-volt, combination type, oil immersed magnetic, across line, with circuit breaker, Class 1, Group D, construction, including explosionproof push-button station at motor	410	410	410	850	850	850
Enclosed fuse and interconnections—440-volt, at controller	53	57	64	108	112	135
Motor feeder (varnished cambric-insulated lead-covered cables), also pushbutton pilot cable, including conduits and fittings for both, of 100-ft. length	184	225	273	387	438	550
Direct material cost	1,498	1,678	2,041	3,005	3,323	3,991
Estimated share of main 440-volt circuit breaker, and incoming service feeder	150	190	250	315	375	500
Estimated share of 2,400/480-volt transformer station	240	300	400	500	600	800
Total material cost	1,888	2,168	2,691	3,820	4,298	5,291
2,200-VOLT EQUIPMENT—						
Motor—2,200-volt, 3-phase, 60-cycle, 1,800-r.p.m., squirrel-cage, explosionproof	972	1,107	1,385	1,746	2,005	2,514
Controller—2,200-volt, oil-immersed, magnetic across line, with 50,000-kva. interrupting rating, Class 1, Group D, construction, including explosionproof push-button station at motor	1,340	1,340	1,340	1,340	1,340	1,340
Disconnecting switch, three-pole, oil immersed, 5 or 7.5 kv. rated	205	205	205	205	205	205
Bus and interconnections—2,200-volt, at controller	160	160	160	160	160	165
Motor feeder (varnished cambric-insulated, lead-covered cables) also pushbutton pilot cable, including conduits and fittings for both, of 100-ft. length	195	195	195	195	195	235
Direct material cost	2,872	3,007	3,285	3,646	3,905	4,459
Estimated share of main 2,200-volt incoming line panel and incoming service feeder	250	250	300	300	300	350
Total material cost	3,122	3,257	3,585	3,946	4,205	4,809
4,160-VOLT EQUIPMENT†—						
Motor—4,160-volt, 3-phase, 60-cycle, 1,800-r.p.m., squirrel-cage, explosionproof†		1,550	1,950	2,360	2,560	2,960

*Only material, the labor cost is about equal to the material cost. †Auxiliary equipment cost about the same as for 2,200-volt equipment.

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PROGRESS in METALS

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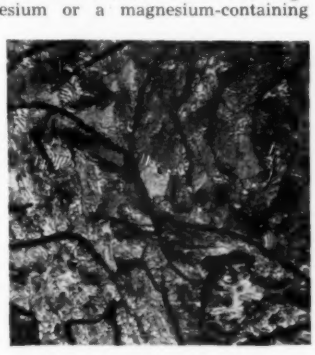
Nodular Cast Iron

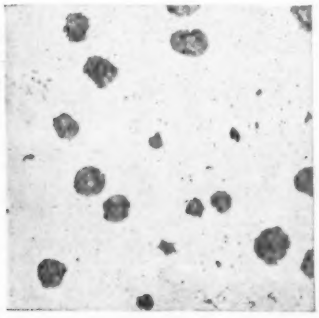
THE main reason for the widespread use of gray cast iron has been its cheapness. This cheapness has been due not only to the low cost of the pig iron from which gray iron is made, but also to the fluidity of the melt, easy castability, and machinability of such materials. However, cast iron tends to be brittle. The nodular or ductile cast irons now being developed commercially combine the favorable characteristics of gray cast iron with the high strength and ductility properties of cast steel.

In this country, American Cast Iron Pipe Co. has been working (C. K. Donoho, American Foundryman, February 1949) on the addition of magnesium for the production of nodular iron and in England the British Cast Iron Research Association has developed the use of cerium. Commercial development appears to be certain but much development work remains to be done. The cost of cerium treatment is higher and it appears that magnesium can be used through a wider range of iron composition. There is some hazard associated with addition of metal magnesium.

The research laboratories of International Nickel Co. have been studying the use of a magnesium nickel alloy and some of their results are described (much as shown below) in the February 17 issue of Iron Age and in Nickel Steel Topics of March 1949. The properties of the new iron, particularly high elastic modulus, high yield strength, and ductility suggest its suitability for many applications hitherto considered beyond the scope of cast iron.

The production of this iron can be applied to common cast-iron compositions melted in the cupola or in other kinds of furnaces, and is based on the introduction into the iron of a small but effective amount of magnesium or a magnesium-containing addition agent, such as a nickel-magnesium alloy.





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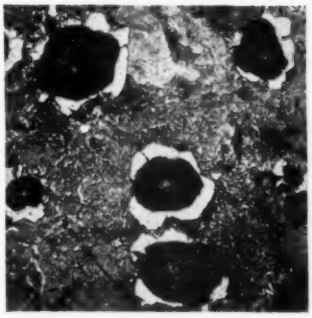

250 ×

Upper photomicrographs show the flakes of graphite found in typical gray cast iron, whereas the nodular graphite of the new ductile iron is indicated in the lower views. The photos on the left (100 ×) are unetched

For pearlitic grades of cupola-melted material containing 3.2 to 3.6 per cent carbon and 1.8 to 2.8 per cent silicon, the ductile iron provides, in the as-cast condition, a combination of 85,000-105,000 psi. tensile strength, with some ductility. In contrast to gray cast iron, its strength is only moderately affected by section thickness. Under stress it behaves elastically like cast steel rather than cast iron, having proportionality of strain to stress up to high loads, with a modulus of elasticity of 25,000,000 psi.

A variety of mechanical property combinations can be developed in ordinary compositions by heat treatment. Simple annealing develops ferritic structures which show 15 to 20 per cent elongation and 65,000 to 75,000 psi. tensile strength. Normalizing and tempering have developed a yield strength of 116,000 psi., a tensile strength of 127,000 psi., and 2 per cent elongation. Quench-and-draw treatments and additional alloying can be used for higher levels of strength.

Endurance properties.—The reduction in severe internal notching, by the elimination of graphite in flake form, favorably improves the endurance properties. Fatigue ratios of 40 to 50 per cent of the tensile strength have been obtained.

Machinability.—In the cast condition this ductile iron, up to 300 to 320 Brinell, has been subjected without difficulty to a considerable variety of cutting operations both under experimental and production conditions, including lathe turning, drilling, milling, shaping, and sawing. It is as free machining as gray iron of the same hardness, but much superior to gray irons having equivalent transverse or tensile strengths. The cut surface tends to be smoother, with less tearing than gray iron exhibits. In lathe turning it forms a broken chip. In the annealed condition, it tends to cut more like steel, with a continuous chip. The new material can be readily arc welded following the techniques established for gray irons.

Applications.—The potential applications for this material are obviously many and varied. The automotive, agricultural-implement, and railroad industries could apply it, both as-cast and heat treated in component parts too numerous to detail. Machinery in general including machine tools, crankshafts, pumps, compressors, valves, and heavy industrial equipment, such as rolls and rolling-mill housings, could readily utilize its high strength and rigidity. Its ductility may provide thermal shock resistance far greater than has been available in high-carbon castings heretofore and suggests that superior performance might be obtained in items such as railroad-car wheels and ingot molds.

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REFINING

Casper Completion Ends Period of T.C.C. Building

Completion this month of a 6,900-bbl. Thermofor catalytic cracking unit for Socony-Vacuum Oil Co., Inc., at Casper, Wyo., marks the end to a continuous period of construction of T.C.C. units begun when the process was first announced by Socony-Vacuum in June 1942. The unit was to be taken over from the contractor, Catalytic Construction Co., Philadelphia, in May. Full operation is anticipated by June 1.

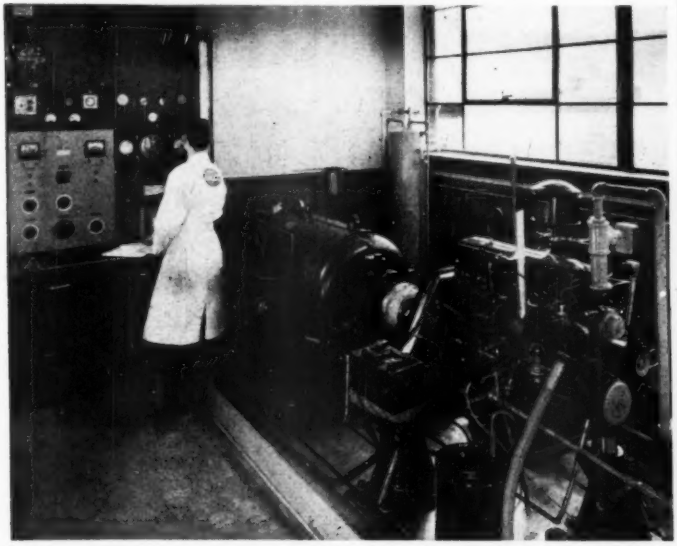
Initial operation of the Casper unit marks the completion of a refinery-wide modernization program which added 3,000 bbl. to daily crude-processing capacity. Also included were new facilities for refinery-gas desulfurization, catalytic polymerization, water treating, and water cooling. Additional light oil, heavy oil, and asphalt pump capacity was installed as well as steam plant, truck loading, office, medical, and machine-shop extensions.

Since 1942 a total of 38 separate T.C.C. units with combined reactor cracking capacities for 349,900 bbl. per stream day, have been erected and placed in operation. They vary in size from 5,000 to 10,000 bbl. per day in capacity. Sixteen refining companies now operate the units at 19 separate refineries in 11 states. The greatest concentration of capacity is at the Torrance, Calif., plant of General Petroleum Corp—36,000 bbl. per day. Other refineries with 30,000 bbl. per day or more in T.C.C. capacity include: Continental Oil Co., Ponca City, Okla.; Richfield Oil Corp., Watson, Calif.; and Standard Oil Co. of California at Richmond and Wilmington.

Braun to Resume Work on Phillips Expansion Project

Construction work on the $10,000,000 expansion project at Phillips Petroleum Co.'s Kansas City refinery will be resumed. Work was suspended in early April when new labor contracts added to the cost of the project.

Completion of the new units will be carried out under an agreement whereby Phillips is guaranteed by C. F. Braun & Co., contractor, that



Engines still on drawing boards of automobile manufacturers undergo motor-fuel tests at the new automotive research laboratory of American Oil Co. and Pan American Refining Corp. at Curtis Bay, Md. This is an engine dynamometer used in studying performance characteristics. Horsepower per pound of fuel, economy in pounds of fuel per brake horsepower hour, as well as combustion chamber and valve deposits, are among combustion-research test problems

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construction cost will not exceed that figure estimated before recent labor wage rate increases went into effect. Under construction are a 24,000-bbl. fluid catalytic cracking unit and a 1,500-bbl. catalytic polymerization unit.

Pan American Refining Buys Triptane Plant

Pan American Refining Corp. has purchased from General Motors Corp. its triptane plant, a semicommercial demonstration unit built to produce the high-octane trimethylbutane used experimentally in high-compression motors.

The plant is being dismantled, and major usable units are being moved from Detroit to Texas City to be incorporated in the company's expanded petroleum-chemicals plant. Triptane will not be produced at Texas City, but the precise fractionation equipment obtained from the plant will augment facilities for manufacture of solvents for plastics, paint, varnish, ink, etc.

Work on the new general office and research laboratory buildings, begun several months ago at the 110,000-bbl. Texas City refinery, has been halted for an indefinite period.

Kanotex Completes Work On Recovery-Vapor System

Kanotex Refining Co. has completed revamping of a vapor-recovery system at its Arkansas City, Kans., refinery. This marks completion of a modernization program, which included installation of a catalytic desulfurization-reforming unit (Perco) with a capacity of 4,200 bbl. daily.

The Kanotex refinery has a crude-oil capacity of 8,500 bbl. daily, and a thermal-cracking capacity of 5,500 bbl. daily.

Sulfur-Recovery Plant to Be Built at Westville, N. J.

Girdler Corp., Louisville, has negotiated a contract with Freeport Sulphur Co., New York City, to build a 40-ton-per-day sulfur-recovery plant, which will produce elemental sulfur from hydrogen sulfide contained in waste gases from several process units of The Texas Co.'s Eagle Point refinery at Westville, N. J.

The sulfur-recovery plant will be located within the refinery limits.

Antiknock Prices Cut

Ethyl Corp. has reduced prices of "Ethyl" antiknock compound. Motor mix has been cut to 57 cents per pound of tetraethyl lead mixture, from 57.7 cents, and aviation mix is now 62.5 cents per pound of tetraethyl lead mixture from 63.2 cents.

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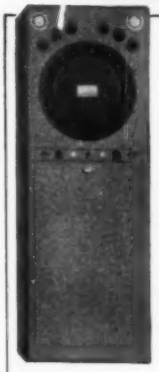

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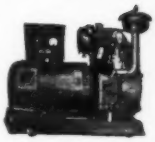

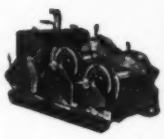

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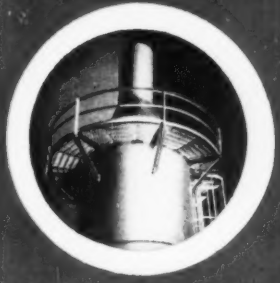

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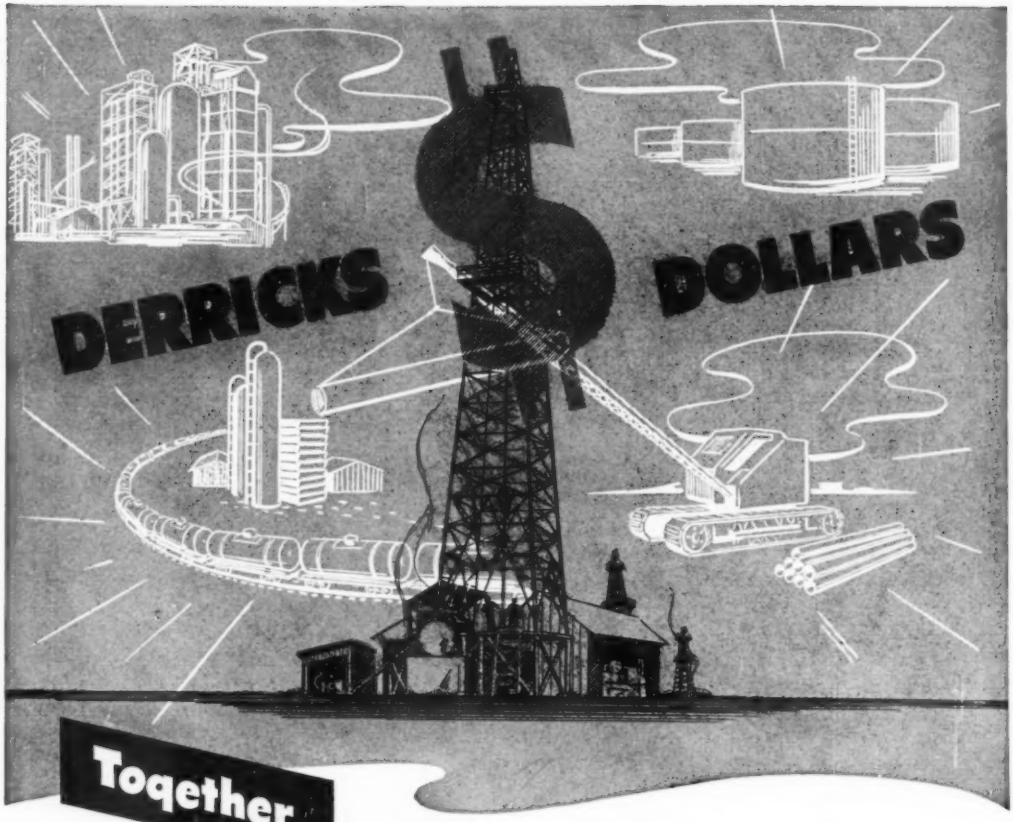

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NATURAL GAS

Largest Compressor Units in World Tested

AT a preview and initial shop testing of new compressor models at Olean, N. Y., early this month, Clark Bro. Co., Inc., announced the construction of the largest single-shaft compressor ever built. The new centrifugal compressor (termed No. 5) is the latest and largest addition to a line of 12 standard combinations of cases and stages covering a wide range of compression requirements. The new 4-stage model has normal speed rated at 4,150 r.p.m. and maximum shaft horsepower of 22,000.

Built for Carthage Hydrocol, Inc., the world's largest compressor combination now being assembled consists of three No. 5, 4-stage centrifugal units mounted on a common shaft, to be driven by a condensing steam turbine. Two of these assemblies will be installed at the Brownsville, Tex., plant of Carthage Hydrocol, which will be the first commercial synthesis plant to convert natural gas to liquid fuels and chemicals.

The two units will perform the initial compression of air in the large-scale oxygen-separation plant. Each assembly, handling 110,000 cu. ft. of air per minute to 180 psia., will be driven by a 23,000-hp. steam turbine consuming 125 tons of steam hourly.

Other centrifugal compressors are under manufacture at Olean for the oxygen and synthesis sections of the Carthage Hydrocol plant. The generation of much steam by the exothermic Hydrocol process, and the large volumes of air, oxygen, and gas handled, make steam turbine-driven centrifugal compressors particularly adaptable at Brownsville. The high volumes and pressure demanded by the Hydrocol process required much advanced engineering in design of the compressors. The oxygen compressor is an example. After low-temperature fractionation from nitrogen, the oxygen is further compressed in a three-stage assembly from 17 to 370 psia. The handling of oxygen at such a pressure requires a number of safety precautions. The lubrication system is so designed that no possible contact of oil with oxygen is possible. Water cooling maintains safe internal temperature, incidently also improving the over-all efficiency of the compressor.

Altogether, 24 new units, having a total installed horsepower exceeding 80,000, will go into the Carthage Hydrocol plant, to comprise the greatest single installation of centrifugal compressors in the world. These units will be employed in compressing air, oxygen, synthesis gas, and reactor-recycle gas.

Natural Gasoline

Continental to Enlarge McAllen Gasoline Plant

Continental Oil Co., Ponca City, Okla., has announced it will spend approximately $1,500,000 for the enlargement of its natural-gasoline plant in Starr County, Texas, 45 miles northwest of McAllen.

Construction is to begin immediately on the expansion project, which will increase gas-processing facilities from a capacity of 13,000,000 to 20,000,000 cu. ft. daily.

The enlarged plant will have a daily average production of about 5,800 gal. of butane and approximately 25,000 gal. of gasoline. It will return approximately 8,500,000 cu. ft. of gas to the five main reservoirs daily. Other gas available will be sold to a pipe-line outlet.

Originally a compressor unit, the plant was developed into a natural-gasoline plant in 1945, and is now serving the Rincon field, which includes 157 oil wells, 7 gas wells, and 8 input wells. Completion of the plant enlargement is scheduled by the end of this year.

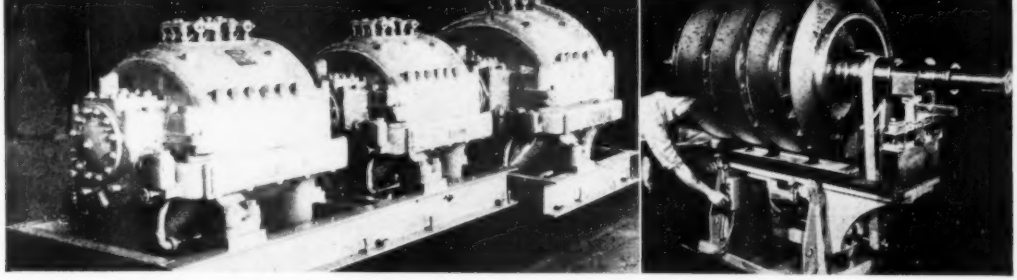
Brief Filed in Louisiana Butane-Industry Suit

A brief filed with the East Baton Rouge Parish, Louisiana, district court by Public Service Commissioner W. Harvey Broyles asks a trial on the merits in the suit of Louisiana Public Service Commission to take control of the $16,000,000 butane industry. The commissioner is acting as attorney in the case.

Members of the commission, including Broyles, Wade O. Martin, Sr., and Nat B. Knight, filed the suit in January, seeking to have declared unconstitutional the act creating the Liquefied-Petroleum Gas Commission, which prescribes safety measures for handling butane, and to be vested with the right to control the industry itself, including the fixing of rates.

Atty. Gen. Bolivar E. Kemp interposed on behalf of the L.P.G. commission and filed exceptions. It was agreed to submit the arguments on briefs, and the attorney general's office filed its brief in March.

In a counterbrief submitted on behalf of the Public Service Commission, Broyles asserts that (1) The butane-gas industry now serves twice as many people as did the natural-gas industry when the gas industry was declared a public utility under the constitution of the state; (2) Butane gas is used for the same purposes as is natural gas; and (3) Unless it is recognized as a public utility its rural users will be without protection afforded by regulation.



This assembly of centrifugals (left) will require 6,200 hp. to compress 1,000 tons of oxygen daily from 17 to 370 psia. High-pressure handling of oxygen required much new engineering in eliminating explosion hazards. Some conception of the size of the No. 5 unit is gained from photo (right) of the balancing unit. The rotor has an impeller diameter of 42½ in.

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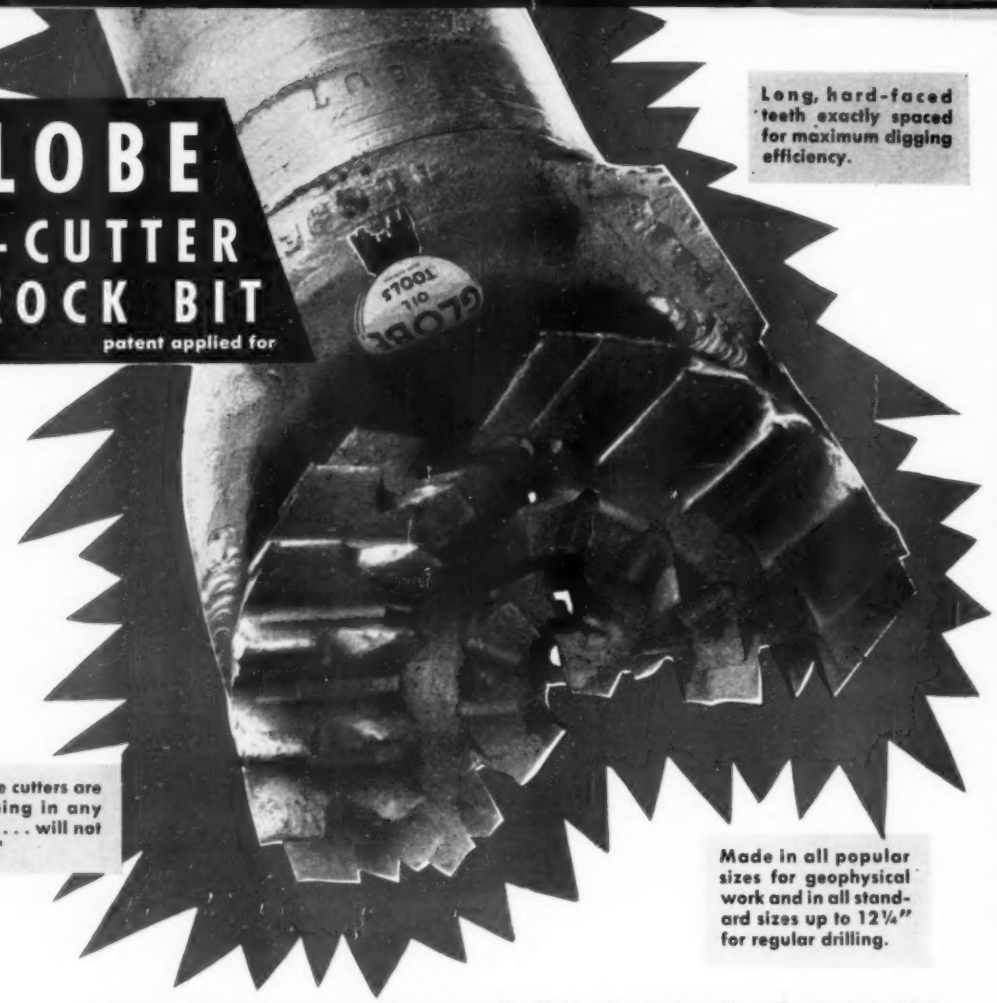

Long, hard-faced teeth exactly spaced for maximum digging efficiency.

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Made in all popular sizes for geophysical work and in all standard sizes up to 12¼" for regular drilling.

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Among the

Drilling Contractors

Falcon Seaboard Forms New Canadian Affiliate

Falcon Seaboard Drilling Co. of Tulsa has announced the formation of an affiliated Canadian drilling company to be known as Falcon Seaboard of Canada, Ltd. The new company already has moved two drilling rigs into Alberta Province. Additional rigs will be moved in with spread of the active drilling play now under way in that area.

B. F. BRIDGES

J. L. STAUSS

Heading the new company as president and resident director with headquarters at Calgary is B. Frank Bridges, who, prior to his retirement in 1945, was general agent of Gulf Refining Co.'s eastern division with headquarters at Indianapolis. He had been associated with Gulf and other Mellon interests for more than 30 years. Since 1948, he has been actively interested in Canadian development.

J. L. Stauss, vice president of Falcon Seaboard Drilling Co., is vice president in charge of operations. Theodore N. Law, president of the Tulsa company, also is a vice president. C. M. Bailey, assistant secretary of the latter company, is secretary-treasurer.

Principal stockholders are Falcon Seaboard Drilling Co., Whitehill Oil Co., Pioneer Corp., Deep Rock Oil Corp., F. E. Bernsen, Claude Harmon and Bridges. Directors are Bridges, Stauss, Law, Bernsen, Harmon, Howard Whitehill, Stanley Brander, William Garbade and Gentry Lee.

Sunray Quits Own Drilling

Sunray Oil Corp. has disposed of the drilling rig and other drilling equipment which it has been operating on the Pacific Coast and is planning to employ contractors on any future wells it may drill in that area. L. L. Kirchhof, Santa Maria, Calif., continues as drilling superintendent.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 5-9-49	Change week ended 5-2-49	5-10-48
Gulf Coast	546	+11	0
W. Tex.-N. M.	558	—13	—12
Ark.-N. La.-E. Tex.	149	+ 1	— 6
Oklahoma	263	+12	—39
Kansas	121	+ 6	—24
Illinois-Eastern	127	—17	+ 9
Rocky Mountains	112	+ 7	—39
Pacific Coast	198	— 6	+20
Total U. S.	2,074	+ 1	—91
Western Canada	77	— 4	+41
Total	2,151	— 3	—50

*Courtesy Hughes Tool Co.

Can-Tex Drilling Co., Calgary, has contracts for two additional wells to be drilled for Western Leaseholds, Ltd., in the Redwater field, northwest of Edmonton, Alta., Canada.

One of the most important discoveries in Kansas in some time is the new 3,206-ft. Viola lime pool lately opened by Carter Oil Co. in the south end of the Forest City basin, in Wabaunsee County. The well was drilled by Adkins Drilling Co. of Great Bend, Kan., whose rig (right) is shown at the location

PENBERTHY

"REFLEX"

WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

USE 'BESTOLIFE IT'S BETTER

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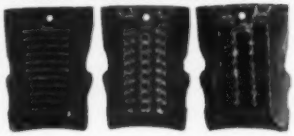
VARCO

CASING SPIDER — AND ELEVATOR SEGMENTS WITH 'VARCO' BUTTONS



"Varco" buttons, popular for years in rotary drill pipe slips, proved satisfactory and have been adopted and are installed in segments of automatic casing spiders and elevators of various makes. Wickers are removed and holes bored for a maximum number of VARCO casing buttons, to assure uniform and maximum gripping area. Converting buttons for the next smaller casing are available. Write for complete descriptive data.

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Chicago, Cincinnati, Cleveland, Dallas, Detroit, Los Angeles, San Francisco, etc.
160 Field Engineers to Help You
America's Welding Alloy Specialists

Cox Drilling Co., Wichita Falls, Tex., has contract for an 8,000-ft. wildcat test to be drilled for Atlantic Refining Co. in western Harrison County, East Texas. Location is in the E. A. Merchant Survey, 7 miles north of Hallsville and south of the Whelan field. Scheduled depth is expected to penetrate approximately 700 ft. into the Travis Peak.

Smiley & Little Drilling Co., Oklahoma City, is moving in tools to drill a wildcat test for M. T. Myers north of the Pauls Valley field, Garvin County, Oklahoma. The test, 1 Trudgeon, NE SW SW 14-4n-1w, has as its objective the Bromide sand, expected at a depth of about 4,800 ft.

Hinkle Drilling Co., Houston, will drill a 9,500-ft. wildcat test in the James McFaddin Survey, 3 miles northwest of the Turtle Bayou field, Chambers County, Texas Gulf Coast. Location is on the Paul Sherman heirs lease.

Layne Central Drilling Co., Memphis, is drilling two experimental tests in western Tennessee for the U. S. Geological Survey and the Tennessee State Geological Survey. One is located 15 miles west of Jackson, in Madison County, and the other near Braden in western Fayette County. Both will be drilled to the Paleozoic, expected in the first test around 1,200 ft. and in the other about 2,000 ft. Light rotary drilling units are being used.

Trigg Drilling Co., Oklahoma City, has been awarded contract to drill a deep wildcat test for Brasil B. Zavoico southeast of Quinlan in eastern Woodward County, Oklahoma. Contract is for 9,500 ft.

Johnson Drilling Co., Wichita Falls, Tex., has started a wildcat test for Barnsdall Oil Co. in the B. H. Simpson Survey, 4½ miles east of Shelbyville, Shelby County, East Texas. The test is 1 West Fickering.

Mohawk Drilling Co. will drill a wildcat test for Granville R. Hayes and Ashland Oil & Refining Co. on the Ponca Indian Reservation, northern Noble County, Oklahoma. Location is 3 miles south of the Ponca City field and 7 miles east of Tonkawa.

Carter-Jones Drilling Co., Kilgore, Tex., is moving in rig to drill a 3,500-ft. wildcat test for Oscar Kemp on the latter's Brooks Cole lease in the J. F. Billingsly Survey, 10 miles northwest of Greenville, Hunt County, East Texas.

Evans & Dobbs Drilling Co., Evansville, Ind., has contracts for two rank wildcat tests to be drilled in western Tennessee. The first test will be for Fred W. Taylor in 10-16s-8e, near Hornsby, Hardeman County. It will be drilled with cable tools, and rig is now being moved in from Fulton, Ky. Contract is for 3,500 ft. The other test will be for Craft and associates and will be located near Waynesboro, Wayne County. Specific location has not been announced.

Drilling Contractors, Ltd., Calgary, Alta., Canada, has been awarded the contract to drill five additional gas wells for Northwestern Utilities, Ltd., in the Viking-Kinsella field, east of Edmonton. The wells will be drilled consecutively, starting early this summer. Gas is obtained from a sand at depths of 2,100 to 2,200 ft.

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For the easiest brake known. It feeds off evenly. Standco never scores brake rims. See pages 3608-3613, Composite Catalog.
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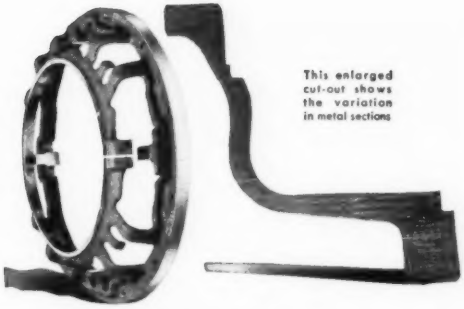
HOUSTON



This enlarged cut-out shows the variation in metal sections

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This is a clutch cover plate that rotates at speeds up to 1,850 RPM—the heart of an improved fluid drive unit manufactured by the Twin Disc Clutch Company for the Allis Chalmers Corporation. Allis Chalmers uses the part in their HD-19 tractor—the largest track-laying tractor in the world.

When several other foundries attempted to produce this part, scrap loss exceeded 30%. Excessive shift, distortion, shrinkage and blowholes were often discovered *after the casting had been machined.* In spite of the high cost, Twin Disc engineers seriously considered redesigning the plate as a weldment.

Then Twin Disc brought us their problem. *We are now producing the plate at normal cost . . . with an abnormally low scrap loss percentage!*

If you have a casting problem, do as Twin Disc engineers did. Call on us.

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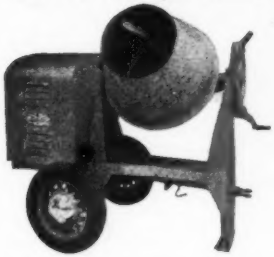

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- 5:00x15 TIRES
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Here at last, a mixer especially designed for the oil field contractor. The rugged all-steel construction, ample power and uniform mixing meets all oil field requirements. 5:00 x 15 tires and a telescoping tongue hitch means easy moving from location to location.

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UNDERGROUND PIPE WRAP

How It Is Used:

When Vitron Underground Pipe Wrap is applied with conventional coating and wrapping machines, the hot coating permeates and saturates the glass fiber mat. The glass fiber then becomes an integral part of the coating thus reinforcing it uniformly throughout the surface of the pipe.

Vitron is available for immediate shipment from warehouse stocks in Tulsa.

Why It Is Used:

1. Reinforces the coating—both tensile and impact strength are improved.
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5. Non-Hygroscopic glass fibers will not absorb moisture
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7. Light in weight—easy to handle and apply
8. Economical—less than 1.5 cents per square foot.

★ Vitron is the trade name of glass fiber underground pipe wrap manufactured by Glass Fibers, Inc., Waterville, Ohio, and sold all over the world by M. J. CROSE Manufacturing Co., Inc.

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PIPE LINES

Transcontinental Contracts 600 Miles of 30-In

HOUSTON.—Awarding of contracts to four firms for the first 600 miles of 30-in. pipe for Transcontinental Gas Pipe Line Corp.'s line from Texas to New York City has been announced.

Morrison Brothers Construction Co. has contract for Schedule 1, from a point just north of Eunice, La., to the Mississippi River, a distance of 67 miles. The company will also construct Schedule 2, for 104 miles, running from the Mississippi River to State Highway 42 in Jefferson Davis County, Mississippi. Work is scheduled to begin June 1.

G. G. Griffis Construction Co. will build Schedule 3 from Highway 42 to the Tombigbee River in Choctaw County, Alabama, a distance of 112 miles. Martin Wunderlich Co. will be associated with Griffis on the project. Work will begin June 1. The contractor will have his field warehouse and office in the former engineering building at the Laurel, Miss., airport and the executive and clerical offices in downtown Laurel.

Midwestern Constructors, Inc., has contract for construction of Schedule 4 from the Tombigbee River in Maringo County, Alabama, to the Coosa River in Chilton County, Alabama, a distance of 103 miles. Schedule 5, which will include that part of the line from the Coosa River to State Highway 16 in Coweta County, Georgia, a distance of 104 miles, will also be built by Midwestern which is now moving on location and actual construction is to get under way by June 1. Both sections of Schedules 4 and 5 will be built by one spread. M. T. Wilhite will supervise operations for Midwestern from headquarters at Demopolis, Ala.

Williams Brothers Corp., will build Schedule 6, which will start at State Highway 16 in Coweta County, Georgia, and terminate at State Highway 36 in Madison County, Georgia.

Ground-breaking ceremonies will be held near Laurel, Miss., May 23. Contract for this portion of the line is held by G. G. Griffis Construction Co. Claude A. Williams, president of Transcontinental and other company officials will attend the official opening ceremonies.

Welding Problems Topic Of A.G.A. Panel Discussion

A variety of pipe-line welding matters were considered at the panel discussion of problems connected with the construction of high-yield strength pipe lines at the close of spring meeting of the Natural Gas Department, American Gas Association, at French Lick, Ind., May 10. The panel included A. P. Maradudin, Standard Oil Co. of California; Harold C. Price, H. C. Price Co.; R. T. Pursell, Stone & Webster Engineering Corp.; and W. A. Saylor, Consolidated Western Steel Corp. R. G. Strong, Natural Gas Pipeline Co. of America, presided as moderator.

Saylor described triple jointing of

Shown here are members of a panel on problems connected with pipe-line welding. The panel discussion was held during the spring meeting of the Natural Gas Department of the American Gas Association at French Lick, Ind. Left to right are R. T. Pursell, welding engineer with Stone & Webster Engineering Corp., Boston; W. A. Saylor, chief metallurgist, Consolidated Western Steel Corp., Los Angeles; Harold C. Price, president of H. C. Price Co., Bartlesville, Okla.; and A. P. Maradudin, materials engineer and metallurgist with Standard Oil Co. of California. Not shown is R. G. Strong, Natural Gas Pipeline Co. of America, Chicago, who, as chairman of the pipe-line subcommittee, presided over the panel discussion as moderator

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when OKLAHOMA CONTRACTING is on the job!

At the beginning of 1949—a total of 37,700 miles of pipeline was planned for construction. Participating in such an important phase of the industry today, a company has got to be OK! 30 years of experience, which includes participation in major sections of the world's greatest pipelines, means world-wide pipelining "know-how" every step of the way—when Oklahoma Contracting is on the job!

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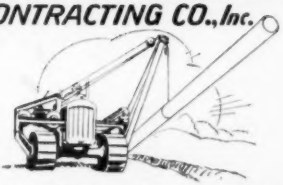

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- (2nd) **Type RN-1** Pig with 2 sets of rotation nozzles; by-pass gas purges brush bristles; brushes may be shimmed to compensate for wear.
- (3rd) **Type RCN-1** Pig with single row of rotation nozzles; new compact design for traversing long-radius factory ells. Light weight construction.
- (4th) Small size, **Type RCN-1** Pig, improved model will negotiate sharp bends; equipped with nozzle plugs for control of by-pass gas. Sizes 8" to 14". Type SCN-1 in sizes 3" to 6".

*Patents pending

THE PIG WITH THE POKE CLEANS PIPE LINES

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TULSA 9, OKLAHOMA

pipe by the Bechtel organization in Arabia with mandrel line up, hydraulic line-up clamps and water-cooled back-up shoes. To improve welding operations, Saylor urged that pipeline company inspectors be sent to pipe mills for opportunity to observe pipe making. In welding the longitudinal seam in the mill there are high stresses at the finishing end of each joint. These are indicated by strain gages. In the field, he said, pipe ends should be specially inspected before line up.

Once a weld is completed it should not be touched with an arc to correct a defect, said Price. He went on to point out that the output of good welders should not be limited by restricting the number of welds to be made daily.

The question came up for discussion by the panel as to why miter welds were not commonly used in pipe lines. Difficulty in beveling for miter welds was claimed to have been overcome by special practices. Miter welds are hard to repair when they leak and offer difficulties for scrapers, but it was observed that there are some pipe-line applications for which miter welds may be effectively used.

A meeting to consider feasibility and need for a separate code for field pipe-line welding was called by Strong, immediately following the panel discussion.

The American Welding Society had already indicated willingness to assist the A.G.A. welding subcommittee. Discussion showed that the venture should have the backing of the gas pipe-line industry, oil pipe-line industry, contractors, and equipment manufacturers. H. D. Hancock, Gas Advisers, Inc., emphasized need for development by the pipe-line industries in lieu of possible state regulations for control of field welding of pipe lines. Approval of the meeting was given to support the pipe line subcommittee in investigation of need for a code on field welding.

Imperial Oil Places Orders For Edmonton-Regina Line

Imperial Oil, Ltd., has placed orders exceeding $9,000,000 for steel plate, for its fabrication into high-strength pipe, and for other equipment for Inter-Provincial Pipe Line Co.'s projected line between Edmonton and Regina.

Roughly 67,000 tons of special steel plate were ordered from Steel Co. of Canada, Ltd., which will make the steel and roll it into plate. It is the largest plate order ever received by the steel company.

The order represents approximately 10 per cent of the steel company's annual ingot capacity, and will take a year to complete. The Edmonton-Regina line is expected to be completed by the end of 1950.

Page-Hersey Tubes, Ltd., will fab-

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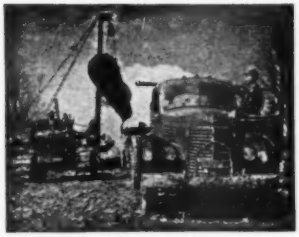

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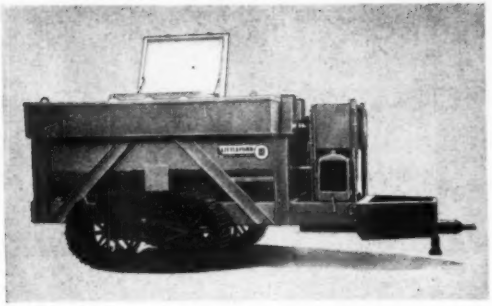

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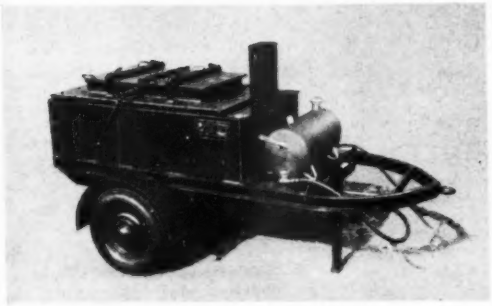

HAND AGITATED PATCH KETTLE . . . Model 84-HD. This kettle has a sweep on the inside and can be operated from either side. Fast trailing is possible with the Model 84-HD Kettle. A one man operated stiff leg of strong channel iron is provided at the front to support the kettle in the standing position.

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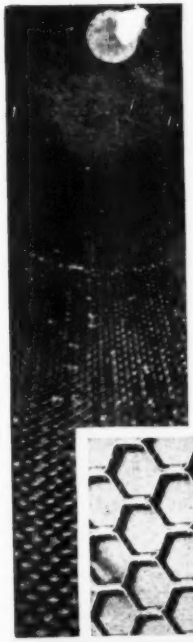

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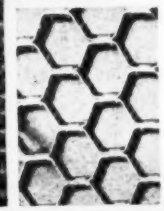

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UPPER LEFT
Hexteel Armor Reinforcement installation in 6-ft. I.D. Fractionating Tower.

LEFT
Section of Hexteel held to wall by direct weld.

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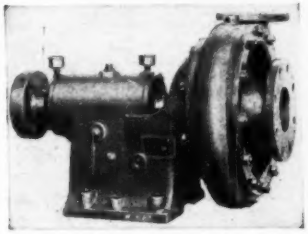

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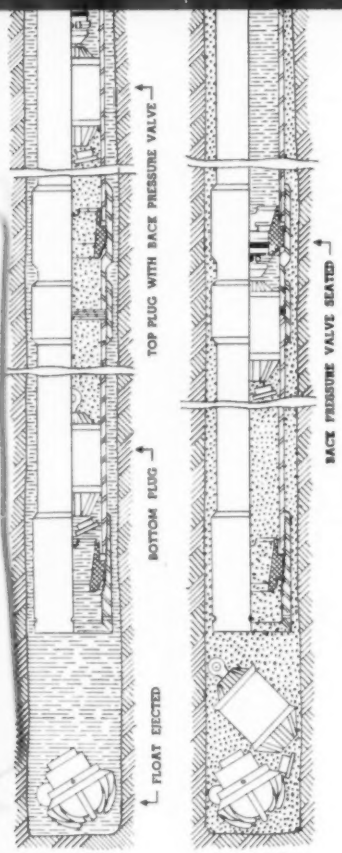
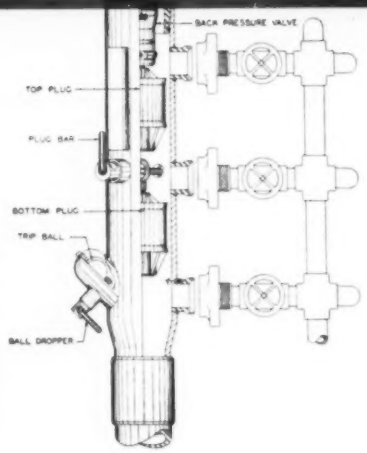
RECTOR ANNOUNCES
Important Advancements in "FULLBORE" Cementing Method



Job in progress. Float assembly ejected from float shoe and bottom plug about to pass through float shoe.

Job completed. Top plug latched, and back pressure valve seated, in stall collar. Bottom plug ejected.



The model "E" cement head provides for dropping of trip ball and cementing plugs by simple external mechanical means, with minimum of shut down time. Head provides a closed circuit and shut in control at all times.

Numerous jobs have proved advancements which make these basic principles of the Rector "Fulbore" Cementing Method more effective than ever in obtaining efficient cement jobs:

1. **Full casing displacement for cement**
2. **Elimination of air in cementing flow circuit**
3. **Cement spaced from fluid by two plug method**
4. **Positive flow back control by piston type back pressure valve.**

FULL CASING DISPLACEMENT FOR CEMENT. The first of the two plugs used is dropped with the top of the mud column, clearing the casing of mud, segregating the mud and cement, and prevents slurry from becoming contaminated.

ELIMINATION OF AIR IN CEMENT FLOW CIRCUIT. The cement head is never opened from the time cementing operations begin until they are completed. It is impossible for air pockets to form in either mud or cement column. Trip ball and plugs are placed in the head before it is made up on the casing string.

CEMENT SEPARATED FROM FLUID BY TWO PLUGS. The first plug is released as soon as the correct volume of properly conditioned mud has been pumped in the well. When the proper amount of cement has been pumped in, the top plug with back pressure valve, is released and travels down with the cement until reaching and latching in the stall collar.

POSITIVE FLOW-BACK CONTROL. When the top plug with back pressure valve latches in the stall collar it prevents flow-back of cement. Operator may bleed the pressure back to zero and leave the well open, or close it in at final running pressure.

IMPROVED EQUIPMENT. The efficient operation of the "Fulbore" Method is assured by the improved cementing head, plugs, back pressure valve, float shoe and stall collar. For complete details of this cementing method and equipment, write for Bulletin No. 4-A, "'Fulbore' Cementing Method and Equipment".

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REPRESENTATIVES IN ALL ACTIVE FIELDS

rication the plate into 457 miles of 16-in. pipe at its Welland, Ont., plant.

Work Under Way on New Pipe Line to Baltimore

Construction operations were in progress last week at all spreads engaged on the 268-mile, 26-in. project of Atlantic Seaboard Corp. and Virginia Gas Transmission Corp. from Clendenin, W. Va., to Rockville, Md., in the Baltimore area.

Two spreads of H. C. Price Co. under Benjamin Williams and Charles Ice, spread men, started east and west from a point about 25 miles from Elkins, W. Va. Price is laying the three eastern sections of the project. Late last week more than 2 miles had been welded. The Ray L. Smith & Son, Inc., spread, with headquarters at Clendenin, W. Va., commenced laying operations last week under J. L. Work, general superintendent, and William Frost, spread man.

Texas Eastern Laying Line Near Lebanon, Ohio

Pipe laying for Texas Eastern Transmission Corp.'s 122-mile, 26-in. loop from Lebanon to Somerset, Ohio, contracted by Associated Pipe Line Contractors, Inc., began early last week near the company's compressor station. Work is under J. A. Williamson, superintendent, and L. D. Gray, spread man, with field office at Lancaster, Ohio.

Crews Preparing to Lay Baxterville Gas Line

Construction crews are being located at Lumberton, Miss., by O. C. Whittaker Construction Co., Fort Worth, for the laying of a natural-gas system in Baxterville field, 12 miles west of Lumberton.

Gas in the field has been purchased by United Gas Co., and the construction firm has a contract to lay the gathering system and a main-line gas pipe line from the field to a point near Mobile, Ala. Rights of way have been secured, and the pipe for the gathering system is already on site.

The main line will require 20-in. pipe. United Gas has been granted a franchise by the City of Lumberton to supply the area with natural gas.

Plains Pipe Line Co. to Lay Mush-Lance Creek Line

Wyoming Public Service Commission has given permit to Plains Pipe Line Co., Newcastle, Wyo., to lay an 8-in. crude-oil line from Mush Creek, in Weston County, to Lance Creek, in Niobrara County, in Wyoming.

The line will have a capacity of 13,400 bbl. of crude daily. It will originate in Fidler Creek field and connect with Plains Pipe Line's gathering system at Mush Creek.

Estimated cost of the line is $1,500,000. Completion is anticipated within 120 days.

Sinclair Increases Product Throughput

Sinclair Refining Co. reports a new high of 89,368 bbl. of products delivered through its eastern division products line on April 25. This compares with a previous high of 89,331 bbl. delivered on January 3 of this year.

Call Boyd

RENTAL EQUIPMENT FOR PIPELINE CONSTRUCTION

- Parsons Wheel Trenchliners
- Bucyrus-Erie Angle Dozers
- Koehring Backhoes, Draglines
- International Trac-Tractors
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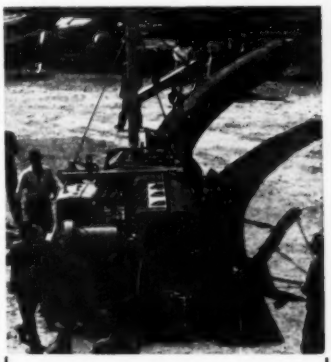

Two joints of 30" pipe welded together to form a length 62' long, shown in the final Bending Stage in the "Cinch" Bender. Note how the pipe was bent continuously through the Welded Joint. This demonstration established firmly, quality on an Economical Basis.

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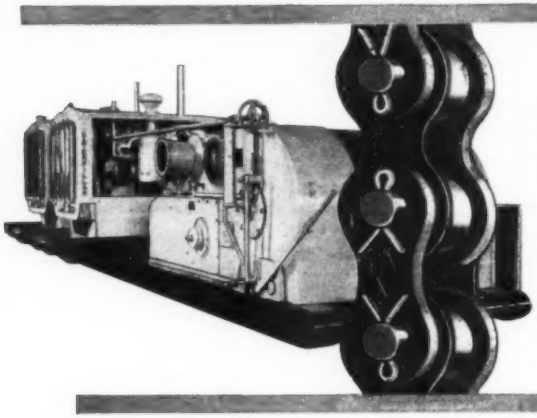

On this first streamlined Model U-10, built by the Unit Rig and Equipment Co., Tulsa, Diamond Roller Chains were used. Performance records revealed unusual long-life dependability, smooth operation, and efficiency.

and ON THE VERY LATEST

Model U-15 Unit Rig which is the very latest Unit for moderate depths. Diamond Roller Chain Drives are regular equipment as well as on the rig shown below—

Unit Rig Model U-30 designed for extremely deep drilling. Both these Diamond Chain equipped Rigs well illustrate excellence in engineering and construction.

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Exploration and Drilling

Permian Basin Continues to Hold Attention

IMPORTANT strikes continue to pile up in the Permian basin area of West Texas-New Mexico at such a fast pace that it is difficult to point to only one strike this week as being of special significance. At least three areas call for special mention.

On the Central Basin platform, east and south of Dollarhide field, in Andrews County, Texas, near the New Mexico line, Magnolia Petroleum Co. 18-B Cowden looks like a sure producer in both the Devonian and Fusselman (Silurian), with the Ellenburger yet to be tested. This well is located in NE NE Section 12, Block A-55, PSL Survey. That puts it about 2 miles east of the regular Dollarhide field, and more important, about 1¾ miles east of a dry hole that cuts off Dollarhide on the southeast. This dry hole revealed the existence of a tremendous fault, possibly as much as 3,000 ft. of downthrow.

The new strike is running 600 ft. to 700 ft. high compared to the dry hole. This still leaves it over 2,000 ft. low compared to the regular Dollarhide field, yet it is showing signs of being a good producer in two of the same pays, with the Ellenburger not yet tested. This suggests a fault block, which while low compared to the producing area on the west, still contains oil in the updip part of the fault block.

In the new basin and hot spot of northern Lea County, New Mexico *(See The Oil and Gas Journal, May 12, 1949, page 139)*, Humble Oil & Refining Co. 1-X State, SE NE 31-11s-35e, has the earmarks of another Pennsylvanian discovery. This well is about 8 miles east and 1 mile north of the Amerada Petroleum Corp. recent discovery in both Pennsylvanian and Ellenburger.

. Over on the Eastern Shelf area, things have been popping so fast in the past 6 or 8 weeks that it would require full time of one man to keep up with what is happening in Scurry County alone. *(See The Oil and Gas Journal, March 10, 1949, page 135)*. This week it is the Hiawatha Oil & Gas Co. 1 Wilson, NW SW Section 183, Block 97, H&TC Survey, that looks like a new producer. This well lies between the present Diamond "M" and the Canyon production at Sharon Ridge.

To the west in the Shelf area, plans for development in the Howard-Borden County Vealmoor strikes are moving fast. Geologists familiar with the area are confidently looking forward to more strikes in Borden County in the not too distant future. To the east in the Shelf area, Fisher and Nolan counties are being combed over for reef structures, and several tests are drilling. Something might well happen in the near future there, too, in the opinion of informed geologists.

The situation today is quite similar to that of almost exactly 1 year ago, new strikes occurring in almost all directions. *(See The Oil and Gas Journal, May 20, 1948, page 259)*. Permian basin oil men think the results speak highly of the work of their exploration men, geophysicists as well as geologists. It could be that as a group the Permian basin exploration scientists are unusually able. Or it could be that the Permian basin is just an extra-rich hunting ground in which to seek oil fields. Most oil men seem to think it is a combination of both, plus the willingness of management to back the judgment of their exploration men. On one thing they are all agreed, namely, that more pipe-line outlets will be needed.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

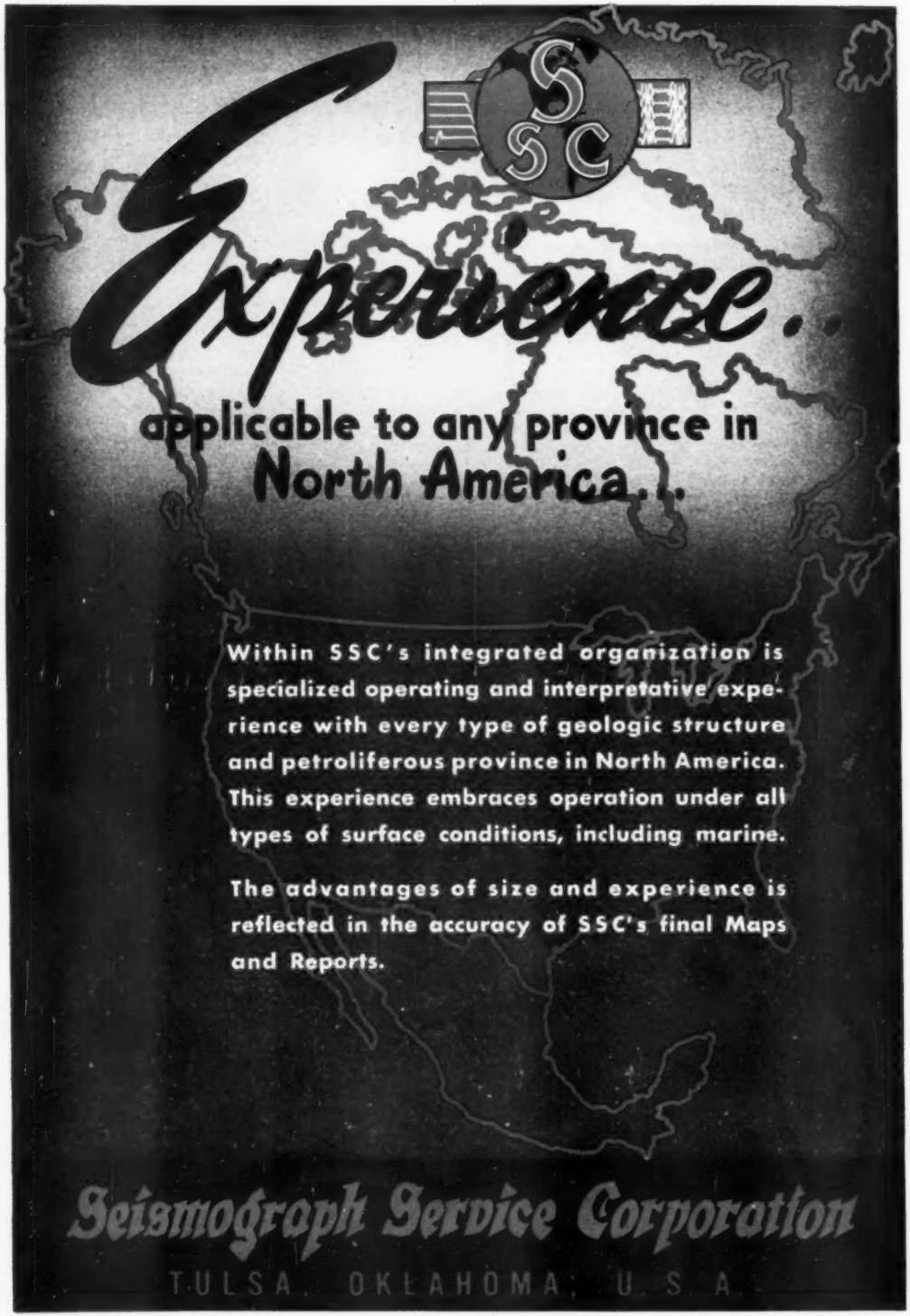
SOUTHEAST NEW MEXICO.—Drilling continued below 10,096 ft. at Humble 1-X State, Pennsylvanian prospect in 31-11s-35e, 8 miles east of Amerada's Pennsylvanian and Devonian discovery, after the second drill-stem test showed considerable salt water. The well headed oil and water after testing at 10,047-88 ft., then flowed 5 bbl. of fluid into tanks in 1 hour from 9,970-10,089 ft. Recovery on the latter test included 630 ft. of 47°-gravity oil plus 8,000 ft. of salt water. Stanolind's Ellenburger discovery, 1 South Mattix Unit, was reported to have developed a flow of 148 bbl. of oil an hour for 4 hours, through open tubing, while being shut in to repair a faulty connection.

WEST TEXAS.—Magnolia Petroleum Co. 18-B Cowden, Devonian and Silurian discovery southeast of the Dollar Hide field, had sulfur water between 11,085-11,121 ft. Completion plan had not been announced. Operators had total depth at 11,244 ft. and were running 7-in. casing.

ROCKY MOUNTAIN AREA.—Carter Oil Co. and Stanolind Oil & Gas Co. recovered oil on drill-stem test of a shale zone at the Roosevelt, Uintah County, Utah, wildcat. Barnsdall Oil Co., Sohio Petroleum Co. and Pacific Western Oil Corp. found oil in the Tensleep on drill-stem test of their Lake Creek, Wyoming, wildcat. Superior is reported below 19,800 ft. at its Pacific Creek, Sublette County, Wyoming, world depth record well.

SOUTH LOUISIANA.—Superior Oil Co. has opened a new gas-condensate area off Vermilion Parish 19½ miles in the Gulf of Mexico. The company's C-1 Gulf of Mexico-State Lease 1106, Block 76, flowed 12 bbl. of condensate plus 7,565,000 cu. ft. of gas per day from perforations at 7,415-30 ft.

CANADA.—Redwater Leaseholds, Ltd., may have a lower Cretaceous discovery at their Campbell 1, LSD 1, 28-54-25w4, Alberta wildcat approximately 20 miles north of Cretaceous production in the Leduc-Woodbend area. Canadian Gulf Oil Co. recovered distillate on drill-stem test of the Madison limestone at the Walter Marr 1.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OKLAHOMA

Ringwood Pool Pay Zone Extended 2 Miles West

RINGWOOD pool in Major County has been extended 2 miles westward by Mazda Oil Co. and Superior Oil Co. in their 1 Boehs, NE SW SE 30-22n-10w. Drilled to a total depth of 6,898 ft. with 7-in. casing at 6,793 ft., the well flowed 412 bbl. of clean oil in a 32-hour production gage through ¾-in. choke following a 20,000-gal. acid treatment. Following the test it continued to flow 11 bbl. per hour or at the rate of 264 bbl. per day. Production is from the Manning zone, the productive horizon of the field, which was topped at 6,790 ft. Two tests are drilling in the field, one on the south side and the other on the west.

Two confirmation wells for the new Benjamin pool in 14-8n-8e, Hughes County, are in process of completion. The pool was opened by J. A. Chapman 1 McKan, NE SE NE of the section, which was completed March 23 in the Cromwell sand at 3,296-3,313 ft., flowing 30 bbl. of oil daily after shooting. Confirmation wells are 2 McKan in the SE SE NE of the same section, a north offset, and William & Copeland and David Beach 1 Love, SE NE NE, a south offset. The former, at total depth at 3,309 ft. with 7-in. casing at 3,261 ft., and with sand slightly higher than in the discovery well, is waiting pipe-line connections. The other cored the sand at 3,297-3,314 ft., about level with the discovery well, and has 5½-in. casing on top. It showed gas and distillate.

Paul J. McIntyre apparently has extended Wewoka pool, Seminole County, northward in his 1 Rosana Harjo, NE SE NW 35-9n-7e. The Booch sand in this well was topped at 3,318 ft. and drilled to 3,338 ft. Cores at 3,320-28 ft. and 3,328-38 ft. carried good oil odors, and in a drill-stem test at the total depth 220 ft. of oil-cut mud without water was recovered. Casing (5½ in.) has been cemented at 3,308 ft.

W. A. Delany, Jr., 1 Long Heirs, NE 14-8n-9e, ¾ mile from oil production of Long pool, Hughes County, has been completed as a 7,200,000-cu. ft. gasser in the Gilcrease sand at 3,131-45 ft. Previously, on a drill-stem test, it had shown for an estimated 4,200,000 cu. ft. It is separated from Long pool by a dry hole.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Tide Water 1 Culpin, SW SE NE 31-1n-2w, pumped 42 bbl. of 31°-gravity oil per day from sand at 711-80 ft., TD 927 ft.

Grant County: Cities Service 1 Pratt, NE SE NE 6-28n-3w, flowed 162 bbl. of 50.5°-gravity distillate from Wilcox at 2,970-85 ft., TD.

Pottawatomie County: Derby 1 Bailey, NW SE NE 9-8n-2e, pumped 15 bbl. of 22.5°-gravity oil per day from Hunton at 5,150-96 ft., TD 5,889 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: Edwards 1 Tar-sar-er, NE NE SE 30-1n-9w, dry, TD 3,008 ft., Arbuckle 2,940 ft.

Cotton County: Richardson 1 State, SW NE NW 16-2s-10w, dry, TD 2,348 ft., sand 2,048-57 ft., 2,101-06 ft., 2,287-96 ft., and 2,329-46 ft.

Wilcox 1 Ille, NW NE NW 34-3s-10w, dry, TD 2,003 ft., sand 1,335-45 ft., and 1,874-87 ft.

Hutcheson 1 Whitehead, SE SW SW 28-3s-12w, dry, TD 1,876 ft., sand 1,573-82 ft., chalky lime 1,582-84 ft., and 1,643-44 ft., sand 1,644-69 ft.

Creek County: Krumme 1 Luman, SW SE SE 33-17n-9e, dry, TD 3,130 ft., Bartlesville 2,616-2,820 ft., sandy lime 3,090-3,105 ft., Mississippi lime 3,115-30 ft.

Garvin County: Carter 1 King, NE SW SW 28-1n-1e, dry, TD 1,176 ft., sand and lime 290-335 ft., 344-73 ft., 661-855 ft., and 953-1,084 ft., hard lime 1,148-72 ft.

Rather 1 Blythe, SW NW NW 29-1n-1e, dry, TD 1,500 ft.

Hughes County: Ashland 1 Hall, NW SE NW 3-8n-10e, dry, TD 3,134 ft., gaged 189,000 cu. ft. of gas.

Kay County: Elm Oil 1 Jones, SW SW SE 17-26n-1e, dry, TD 4,341 ft., Oread 2,142 ft., Checkerboard 3,476 ft., Big lime 3,630 ft., Oswego 3,686 ft., Mississippi lime 4,210 ft.

Kiowa County: O'Brecht 1 John Anderson, SW SE NE 34-2n-18w, dry, TD 40 ft.

Lincoln County: Deardorf Oil 1 Welborn, SW SW NW 28-12n-4e, dry, TD 5,680 ft., Hunton 5,369 ft., Sulvan 5,395 ft., Viola 5,476 ft., dense 4,415 ft., dolomite 5,540 ft., first Wilcox 5,560 ft., sand 5,590 ft., second dolomite 5,610 ft., second Wilcox 5,640 ft.

Falcon-Seaboard 1 Danker, NE SE NW 8-13n-3e, dry, TD 4,781 ft., Checkerboard 3,596 ft., upper conglomerate 3,615 ft., lower conglomerate 3,644 ft., Oswego 4,215-53 ft., Prue 4,282-4,366 ft., Verdigris 4,384 ft., Skinner 4,422-39 ft., Bartlesville 4,663-71 ft., lime 4,721-39 ft.

Logan County: Jordan 1 School Land B, NW NW NW 36-16n-1w, dry, TD 5,771 ft., Avant 3,614 ft., Hogshooter 4,146 ft., lower Hogshooter 4,223 ft., Checkerboard 4,404 ft., Oswego 4,865 ft., Prue 4,992 ft., Verdigris 5,023 ft., Mississippi lime 5,210 ft., Woodford 5,258 ft., Misener 5,344 ft., Hunton 5,350 ft., Sulvan 5,413 ft., Wilcox 5,667 ft., second Wilcox 5,753 ft.

Okfuskee County: Keener 1 McMahon, SW SE NE 26-12n-9e, dry, TD 3,322 ft., Barlesville sand 2,550-2,664 ft., lime 2,710 ft., Booch 2,855-75 ft., Gilcrease 3,061 ft., Wapanucka 3,264 ft., no Cromwell, Pitkin lime 3,295 ft.

Amerada 1 Leonard, SE SE SW 14-13n-7e, dry, TD 4,365 ft.

Okmulgee County: Hall 1 Bryan, SW SW NW 17-11n-13e, dry, TD 2,550 ft.

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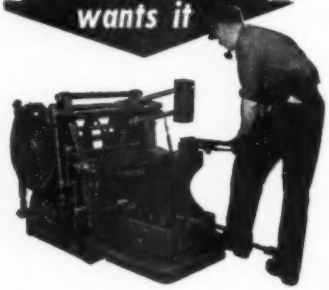

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Pawnee County: Aladdin 1 Sneed, SE SE NE 4-20n-4e, dry, TD 3,360 ft.

Aladdin 1 Colclazier, C NE SW 8-21n-6e, dry, TD 3,147 ft., Avant lime 1,650 ft., Dewey 1,680 ft., Oswego 2,495 ft., Prue sand 2,685-2,710 ft., Mississippi lime 3,000 ft., Woodford 3,108 ft., Simpson dense 3,129 ft., sandy dolomite 3,132-44 ft.

Payne County: Coronado 1 Tathwell, NW NW NE 11-19n-4e, dry, TD 4,104 ft., Checkerboard 2,926 ft., Big lime 3,168 ft., Oswego 3,284 ft., Prue 3,352 ft., Verdigris 3,432 ft., lower Skinner 3,526 ft., lime 3,556 ft., Red Fork 3,574 ft., Bartlesville 3,674 ft., Mississippi lime 3,856 ft., Woodford 3,949 ft., Misener 3,960 ft., Viola 4,011 ft., dense 4,033 ft., dolomite 4,045 ft., first Wilcox 4,052 ft., second Wilcox 4,098 ft.

Stephens County: Martin Properties 1 Ball, SW SE SE 2-1n-9w, dry, TD 2,503 ft., sand 1,750-62 ft., lime 1,796-1,804 ft., sand 1,930-20 ft., and 1,942-52 ft., broken sand 1,988-2,040 ft., lime 2,268-84 ft., sand 2,322-63 ft., and 2,413-36 ft.

EASTERN TEXAS

Hopkins Has New Paluxy Prospect

DALLAS.—Prospects of a new Paluxy field in Hopkins County, 3½ miles northeast of Mitchell Creek Paluxy field, was indicated by Byars & Peveto 1 Tulley, SP Survey, 10 miles north of Mount Vernon. A drill-stem test from 4,390-4,436 ft., open 15 minutes, recovered 1,800 ft. of fluid, estimated to be 5 per cent oil. A second test of the same interval, open 75 minutes, recovered 4,000 ft. of fluid, said to be 25 per cent oil, and the remainder formation water and mud. Flowing pressure was 1,550 psi., and 600 psi. shut in.

The well was then swabbed, with fluid level 325 ft. from surface, which yielded approximately 25 per cent oil and the remainder water. Pumping equipment was installed and at last report it was making around 350 bbl. of fluid daily, being 10 per cent oil. Liner was set on bottom at 4,436 ft. and perforated from 4,392 ft.

In Bowie County, Gulf Oil Corp. 1 Veach, McFarland Survey, was waiting on orders. A 4½-minute drill-stem test from packer at 9,770-79 ft. recovered 3,000 ft. of water cushion and 180 ft. of mud.

Placid Oil Co. 1 Winston, William D. Perry Survey, 3 miles northeast of Lotta in Harrison County, prepared to core ahead with total depth at 8,273 ft. in hard sand. A 45-minute drill-stem test from 8,259-73 ft. recovered the 2,000-ft. water cushion with no shows.

In Sabine Parish, S. J. Carnes 1 Pickering Lumber Co., Rodessa wildcat 3 miles east of Geneva in F. J. Ballamora Survey, had cored to 6,149 ft. in sand, and was drilling out. A 15-minute test at 6,025-32 ft. recovered 25 ft. of oil, 45 ft. of oil and gas-cut mud, and 120 ft. of salt water. Bottom-hole flowing pressure was 100 psi. Cores from 6,032-37 ft. recovered 1½ ft. of porous lime with fair oil saturation. From 6,138-41 ft. recovery was 8 in. of porous lime with no shows, and from 6,141-46 ft. there was 6 in. of very porous lime with light stains and salty taste. Top on the upper Glen Rose was 5,300 ft., on elevation of 378 ft.

EAST TEXAS (DISTRICTS 5, 6 & 6-P) WILDCAT FAILURES

Denton County: Falcon-Seaboard Drilling Co. 1 Mrs. J. M. Gracie, G. M. Dial Sur. A-379, 2 mi. E Pilot Point, dry, TD 2,535 ft.

Robertson County: Calvert Corp. and Chase Oil Co. 1 Foyle Woodall, C. Charle Sur. 3, 7 mi. NW Calvert, dry, TD 2,500 ft., no shows.

Wood County: F. R. Jackson 1 Lechner & Padgett, Francis Holland Sur., 4 mi. W Mineola, dry, TD 5,530 ft., sample tops: Pecan 2,785 ft., Austin 4,600-4,790 ft., Woodbine 5,304 ft., elev. 391 ft.

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KANSAS

Rooks County Exploration Opens Another New Pool

ANOTHER new Arbuckle lime pool for Rooks County is being opened by Francis Oil & Gas Co. in its 1 Wilson, NE NE NE 2-10-20. At a total depth of 3,831 ft. with Arbuckle topped at 3,823 ft. (minus 1,584 ft.), the well is reported to have swabbed 9 bbl. of oil per hour. It is 2 miles southeast of Northhampton pool and the same distance north of a good well recently completed by Nadel & Gussman and Aurora Gasoline Co. in the SE SE NW 7-10-19. The latter, 1 Ouderkirk, completed in the Arbuckle, topped at 3,757 ft. (minus 1,536 ft.), is a mile north of North Berland pool.

M. B. Armer 1 Teall, NW NW SE 9-10-21, another new pool opener in Graham County, swabbed 2 bl. of oil per hour from the Lansing with casing perforated at 3,528-34 ft. Lansing was topped at 3,483 ft. (minus 1,154 ft.). The Arbuckle, topped at 3,817 ft. and drilled to 3,822 ft., proved dry.

Aladdin Petroleum Corp. and Hannum Drilling Co. have opened a new pay zone, the Lansing, for North Hammer pool in Barton County. Their 3 Brodie, NW SW SE 23-19-12, with Lansing topped at 3,097 ft. (minus 1,288 ft.) and casing perforated at 3,222-52 ft., pumped and flowed at the rate of 645 bbl. per day on potential test.

In Butler County, Rex & Morris have opened a new Mississippi lime pool in their 1 Ammeter, SW SE SW 30-23-5e, which made 30 bbl. of 38°-oil per day on potential. Pay is at 2,461-72 ft. Location is a mile north of Hazlett pool.

Ferrell Drilling Co. 1 Rous, SW SW SE 31-16-10, Southwestern Ellsworth County, a wildcat 1 mile east of Kraft-Prusa pool (Barton County) and 1½ miles north of Bloomer pool, made 48 bbl. per day on potential from the Arbuckle; topped at 3,389 ft. (minus 1,468 ft.). Bottom is 5 ft. in the pay.

KANSAS SUCCESSFUL WILDCAT

Butler County: Rex & Morris 1 Ammeter, SW SE SW 30-23s-5e, 30 bbl. of 38°-gravity oil per day from Mississippian topped at 2,461 ft., TD 2,472 ft.

KANSAS WILDCAT FAILURES

Barton County: B & R 1 Seidel, NW NW SE 26-16s-15w, dry, TD 3,553 ft., Arbuckle 3,504 ft.

Butler County: Adair 1 Osborne, NE NE SE 30-25s-4e, dry, TD 2,691 ft., Mississippi lime 2,520 ft., Viola 2,683 ft.

Ramsey 1 Delivuk, NW NW NE 9-28s-3e, dry, TD 3,152 ft., Simpson 3,087 ft., sand 3,148 ft.

Chase County: Amerada 1 Heter, NW NW NE 4-21s-7e, dry, TD not released, strat test.

Ellis County: Harbar et al 1 Chapman, NW NW SW 18-11s-18w, dry, TD 3,533 ft., Topeka 2,902 ft., Heebner 3,131 ft., Lansing-Kansas City 3,171 ft., sand 3,423 ft., Simpson dolomite 3,472 ft., Simpson shale 3,478 ft., Arbuckle 3,493 ft.

Brunson 1 Walter, SW SW SE 34-11s-18w, dry, TD 3,779 ft.

McPherson County: Ingling et al 1 Schmidt, SW NW SE 23-18s-1w, dry, TD 2,850 ft., Kansas City 2,257 ft., Mississippi lime 2,828 ft.

Reno County: Huber et al 1 Haines, SE SE SW 5-25s-5w, dry, TD 4,003 ft., Lansing-Kansas City 2,749 ft., Mississippi lime 3,454 ft., Misener 3,829 ft., Maquoketa shale 3,833 ft., Viola 3,857 ft., Simpson 3,880 ft.

Rooks County: Hinkle et al 1 Veverka, NW NW NW 8-8s-18w, dry, TD 3,443 ft., Sooy 3,387 ft., Arbuckle 3,411 ft.

Gore 1 Slansky, NW NW NE 35-8s-19w, dry, TD 3,510 ft., Sooy 3,455 ft., Arbuckle 3,460 ft.

Doley 2 Thomas, SW NW SE 29-10s-20w, dry, TD 3,834 ft., Lansing-Kansas City 3,450 ft., Arbuckle 3,812 ft.

Russell County: Peel-Hardman 1 Foster,

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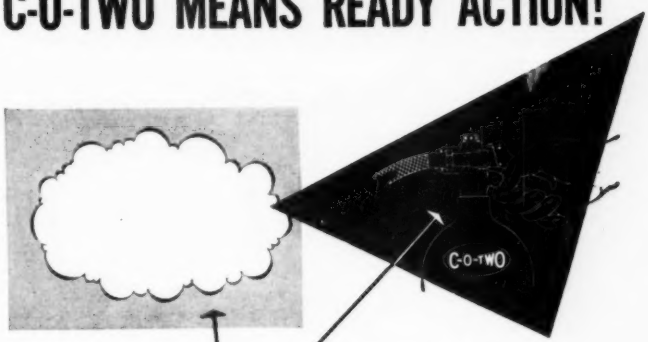

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NW NW SE 5-13s-14w, dry, TD 3,159 ft., Lansing-Kansas City 2,859 ft., Arbuckle 3,145 ft.

Stafford County: Crown Oil 1 Newell, SE SE SW 21-14s-11w, dry, TD 3,865 ft.

MISSISSIPPI

Yellow Creek Field Gets New Producer

JACKSON.—Gulf Refining Co. 20 Andrews, 5-1n-16w, in Baxterville field, Lamar County, has been completed flowing an initial production of 124 bbl. of oil through an 11/64-in. choke. Total depth is 8,865 ft., with perforated interval from 8,706 ft. to 8,854 ft. Top of Butler 8,718 ft., Cooper 8,835 ft.

In Mallalieu field, Lincoln County, The California Co. 1 J. F. Jordan et al, 10-6n-8e, was drilled to a total depth of 10,574 ft., and on potential test flowed 280 bbl. of 37.9°-gravity oil through perforations at 10,518-27 ft.

Yellow Creek field, Wayne County, received a new producer with the completion of Magnolia Petroleum Co. 1 Ed Gatlin, NE NW 14-9n-8w. This well is producing from the Stanley sand pumping an initial production of 115 bbl. of oil plus 12 bbl. of water. Total depth is 5,233 ft., with perforations at 5,154-66 ft.

Four wildcat starts were reported this week, two in Adams and one each in Jones and Lincoln counties. Three development locations were made, one each in Heidelberg field-West, LaGrange and LaGrange-South fields. Four wildcat failures were completed, one each in Adams, Holmes, Lawrence, and Madison counties.

MISSISSIPPI WILDCAT FAILURES

Adams County: Gholson, Gholson & Smith 1 Narcissa Clark, 42-6n-1w, dry, TD 7,001 ft. Tops: Wilcox 4,381 ft., Baker shale 6,235 ft., Baker 6,317 ft.

Holmes County: Vester Williams 1 H. H. Wynn, NW 8-12n-3e, dry, TD 6,313 ft.

Lawrence County: Danciger Oil & Refining Co. 1 Brown, Unit 1, SW NW 4-6n-11e, dry, TD 10,238 ft. Top Tuscaloosa 8,910 ft., Marine Tuscaloosa 9,587 ft., Lower Tuscaloosa 9,804 ft.

Madison County: Richard L. Lawrence, John Edmonds et al-Unit 1, 22-10n-4e, dry, TD 4,995 ft. Top Selma 3,966 ft., top Eutaw 4,958 ft., rist sand 4,967 ft.

GEORGIA WILDCAT FAILURE

Echols County: Humble 1 Bennett & Langsdale, 12th Land District, Lot 146, TD 4,182 ft.

SOUTH LOUISIANA

Gas-Condensate Discovery Off Vermilion Parish

NEW ORLEANS.—The new gas-condensate discovery in the Gulf of Mexico, 19½ miles offshore of Vermilion Parish, Superior Oil Co. C-1 Gulf of Mexico-State Lease 1106, Block 76, has been completed for a potential of 12 bbl. of condensate per day and 7,565,000 cu. ft. of gas per day through a 10/64-in. choke, gas-condensate ratio approximately 716,176, tubing pressure 2,810 psi., and 45.6° gravity. No water was in the flow. Production is through perforations at 7,415-30 ft. Total depth is 11,603 ft.

Barnsdall Oil Co. 1 M. Jones, a wildcat in the East Longville area of Beauregard Parish, recovered 300 ft. of pipe-line oil on drill-stem test which was conducted while at a depth of 8,310 ft. Hole was cored ahead to total depth of 8,355 ft., where log was run and sidewall cores taken. Operators now are reaming hole to run a string of 7-in. casing.

It is reported that three sands have been picked up showing commercial oil and gas production in Hunt Oil Co. 1 State Lease 1292-Goodrich Unit 1, 2-15s-11e, Duck Lake area of St. Martin Parish. Sands reported are at 11,672-83 ft., showed oil; 12,336-12,420 ft., a net of 65 ft. of gas-condensate sand; and at 12,815-60 ft., 35 ft. net of oil pay is reported to be productive. Operators are running electric log. Total depth is 13,005 ft. This field was opened by Humble Oil & Refining Co. on the Atchafalaya Land Co. tract, in Section 2-15s-11e.

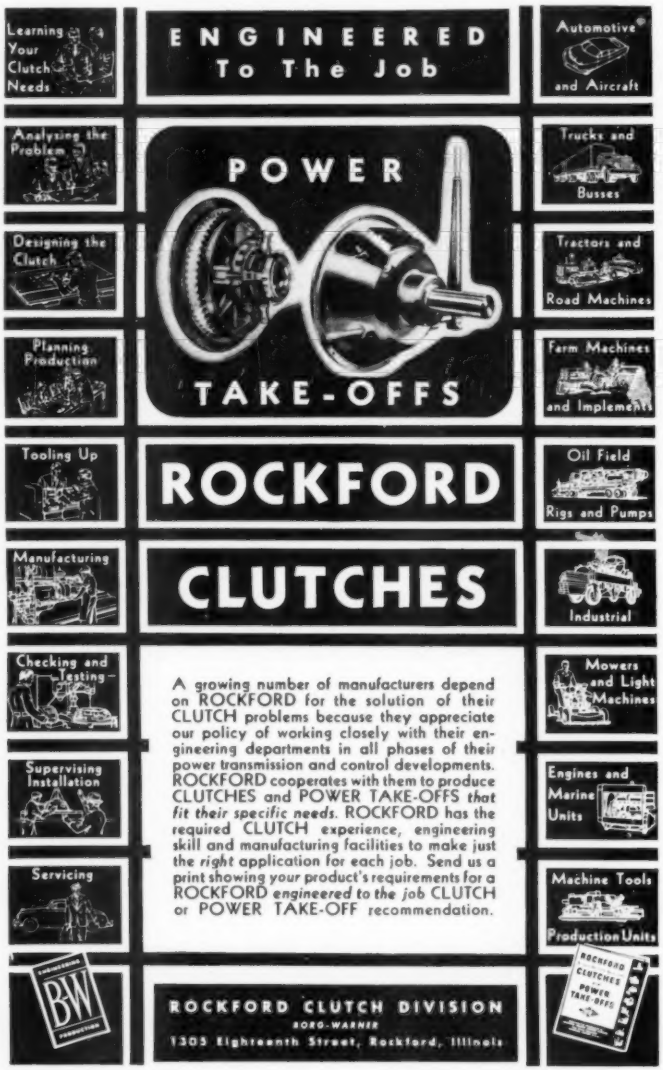
The California Co. is testing in two new sands on the Bay Marchand salt dome off the Lafourche Parish shore line in the Gulf of Mexico. The 3 State Lease 1367, Block 3, is testing through perforations at 5,048-5,062 ft. Total depth is 5,525 ft., top of salt 5,525 ft. Also, The California Co. 2 State Lease 1366, Block 2, Marchand area, is testing in two sands, 2,056-65 ft., and 2,990-3,005 ft. The 7-in. casing has been cemented to 4,339 ft. Total depth is 5,448 ft.

There were 19 new locations reported for South Louisiana, with 3 being wildcat starts, 2 in Iberia and 1 in Terrebonne Parish. Two successful exploratory tests were completed, one a gas-condensate discovery in Gulf of Mexico offshore Vermilion Parish, and a new oil pay in Four Isle Dome, Terrebonne Parish. One dry wildcat was completed in St. Martin Parish.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Terrebonne Parish: New oil sand, Four Isle dome—Superior Oil Co. 5-12 LLE-State Unit, 24-21s-16e, TD 11,827 ft., top sand 11,140 ft., perf. 11,140-52 ft., IP 327 bbl. oil per day through 9/64-in. choke, GOR 1,008, TP 2,575 psi., 34° grav., no water.

Vermilion Parish: New gas-condensate discovery, Vermilion area—Gulf of Mexico—Superior C-1 Gulf of Mexico-State Lse. 1106, Blk. 76, 19½ mi. offshore, TD 11,603 ft., top sand 7,415 ft., perf. 7,415-30 ft., IP 12 bbl. condensate per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SOUTH LOUISIANA WILDCAT FAILURE

St. Martin Parish: Continental Oil Co. 1 L. F. Siadous, 6-11s-6e, SE of St. Martinsville field production, dry, TD 11,230 ft.

N. CENTRAL TEXAS

New Pay Found In New Pool

WICHITA FALLS.—Ellenburger production offsetting Post Oak Strawn field of Jack County, opened early this year, was reported at Mid-Continent Petroleum Corp. 2 Killen, B. Lewis Survey. The 2 Killen completed for a flowing potential of 313 bbl. of 45°-gravity oil a day, through 14/64-in. choke. Flowing pressure was 500 psi., and gas-oil ratio was 790 cu. ft. Production was through casing perforations at 6,240-58 ft.

Glasscock and Pontiac Refining Co. 1 R. L. Morris, J. U. Fields Survey, 2 miles west of Chico field of Wise County, flowed 7 bbl. of oil an hour for 2 hours when the flow turned to gas. Production was from perforations at 5,438-69 ft. New perforations were to be made from 5,413-26 ft. in an effort to lower the gas. Wells on the near side of this conglomerate field have also been troubled with high gas-oil ratios.

Archer County.—Moran Bros. 1 William McGregor, 4-1-H&TC, had prospects of extending Strawn sand production about 1 mile east of the 3,870-ft. Medders-Hancock field. The 1 McGregor topped the sand at 3,872 ft. and drilled saturated formation to 3,880 ft. A 1-hour drill-stem test from 3,867 ft. showed gas in 30 minutes and recovered 1,100 ft. of clean oil, with no water. Bottom-hole pressure was 1,575 psi. in 15 minutes. Operators set casing on top of the sand for completion. This well is the first deep test to be made on the McGregor Ranch, according to reports, and is being watched with considerable interest.

Montague County.—S. D. Johnson 1 Pauline Hamilton, D. Redwine Survey, 3½ miles north of Saint Jo, topped a Strawn sand at 2,865 ft. and drilled 10 ft. of saturated sand. A drill-stem test from 2,865-75 ft., open 90 minutes, had gas in 32 minutes and recovered 390 ft. of clean oil, with no water. Casing was set on top of the sand. Bottom-hole pressure was 1,150 psi. in 15 minutes.

Clay County.—Gulf Oil Corp. 1 Ewing, Block 19, HT&B Survey, southwest offset to the discovery of Lazy B field of western Clay County, recovered 1,170 ft. of salt water on a 1-hour drill-stem test of the Caddo at 5,609-16 ft. Drilling continued below 5,620 ft.

Consolidated Oil Co. and Premier Refining Co. 1 J. M. Windler, Block 58, J. H. Belcher Subdivision, 5 miles northwest of Joy, plugged back from 5,385 ft. and prepared to test a sand showing oil at 3,775-95 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Fisher County: Woods Drilling Co. 1 Radford & Shell, NW NW 13-B-W, E. Hatchet Sur., A-1701, 2½ mi. W Royston, flowed 154 bbl. 38°-grav. oil a day, 28/64-in. choke, Canyon lime 4,732-40 ft., TD, GOR 400 cu. ft.

Shackelford County: Danciger Oil & Refining Co. 1 Edwards Heirs, Sec. 22, L.A.L., 4½ mi. SW Sedwick, flowed 109 bbl. 40°-grav. oil in 9 hr., ⅛-in. choke, pay 4,131-44 ft., TD 4,351 ft.

Young County: Signal Oil & Gas Co. et al 1 G. D. Hunt, TE&L Sur., 11 mi. W Graham, flowed 187½ bbl. 43°-grav. oil a day, 12/64-in. choke, Marble Falls 4,513 ft., TD 4,637 ft., TP 200 psi., GOR 500 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Clay County: E. B. Clark 1 M. C. Brannon, T. Plemons Sur., 1½ mi. SW Dean, dry, TD 6,001 ft., tops not reported.

Morris & Scherck 1 J. J. & W. L. Parker, Sec. 22, MEP&P Sur., 5 mi. SE Byers, dry, TD 3,775 ft., sand with oil show 3,257 ft., dolomite 3,661 ft.

Jones County: Clark & Cowden Drilling Co. 1 Manley Bros., Sec. 41, O.A.L., 10 mi. E. Anson, dry, TD 2,343 ft., coal 1,908-13 ft.

Herman Bros. 1 Otto Sosebee, Sec. 37, Blk. 15, T&P, 6 mi. W Nugent, dry, TD 1,961 ft., Fry sand 1,710 ft., water 1,730 ft.

T. D. Humphrey 1 Mrs. R. Dunlap, Sec.

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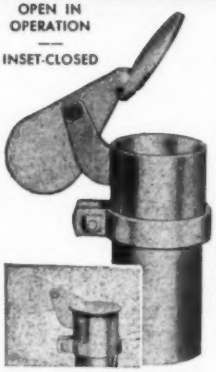

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22, Blk. 4, H&TC, 1 mi. W Avoca, dry, TD 5,133 ft., had oil-cut mud at 3,011-32 and 5,002-13 ft.

Welch & White 1 B. Manley, Sec. 20, Blk. 14, T&P, 7½ mi. SE Nugent, dry, TD 2,045 ft., Saddle Creek lime 1,647 ft.

Nolan County: The Ohio Oil Co. 1 City of Sweetwater, approximately NE NE 43-22-T&P, 3½ mi. W Sweetwater, dry, TD 7,115 ft., Reef lime 6,248 ft., Caddo 6,807 ft., Mississippi 6,857 ft., Ellenburger 6,895 ft., elev. 2,300 ft.

Parker County: R. W. Brown 1 S. Jackson, 18 mi. SW Weatherford, dry, TD 5,226 ft., conglomerate 4,345 ft., Barnett shale 4,870 ft., Ellenburger 5,030 ft., elev. 871 ft.

Taylor County: Twin Oil Corp. 1 Lon Largent, Blk. 9, Grimes CSL, 2½ mi. N Merkel, dry, TD 5,083 ft., Flippen 2,615 ft., Gunsight 3,010 ft., Reef 3,600 ft., DST 4,516-28 ft. recovered 75 ft. of oil, 35 ft. of salt water.

Wichita County: J. D. Thweatt 1 Mrs. C. Scales, Sec. 313, Waggoner CSL, 10 mi. NE Electra, dry, TD 2,200 ft.

Frank Wood 1 J. A. Staley, Blk. 34, Red River Valley Lands, 4 mi. W Burkburnett, dry, TD 2,006 ft., sand with oil show 1,849 ft.

Young County: L. T. Burns 1 C. I. Lowe, Sec. 250, TE&L Sur., ¾ mi. S True, dry, TD 4,200 ft., Caddo 4,081 ft.

MICHIGAN

Gladwin County Test Good For 6-8 Bbl. Per Hour

MOUNT PLEASANT.—On the basis of early pump-flow tests after acid, W. L. McClanahan 1 Rhinehardt, NE NE NW 6-17n-2w, Beaverton Township wildcat, Gladwin County, appeared to be good for from 6 to 8 bbl. of oil an hour. McClanahan indicated that he planned to hold daily production to approximately 50 bbl. a day.

Wildcat was bottomed out in the Dundee at 3,948 ft. after top of this objective was logged at 3,880 ft. Hole carried about 1,800 ft. of fluid natural over a 48-hour period which was acidized with 1,000 gal. after a 4-ft. plastic blanket was set from the total depth back to 3,944 ft. as a precautionary measure against possible bottom-hole water encroachment.

First 7 hours after acid treatment a total of 60 bbl. of net oil was pumped and flowed, while during the next 6-hour test period 48 bbl. was recovered by the same production method. Well was not pumped off after either test.

Discoverer McClanahan announced three new follow-up locations to be drilled immediately in the district. Tools will be moved to the direct north and east offsets and to the third location west of the wildcat producer for new drilling activity in the area.

Socony-Vacuum Oil Co., Inc., 1 State-Billings A, NE SW SE 2-17n-1e, diagonal northwest 20-acre offset to same company's Billings field discovery producer, was under test in the Dundee objective at 3,572 ft. with 600 ft. of free oil showing natural from a pay which started to show at 3,528 ft. This developmental test may be carried to the "salt taste" to determine water-table level in this new Gladwin County field.

MICHIGAN SUCCESSFUL WILDCAT

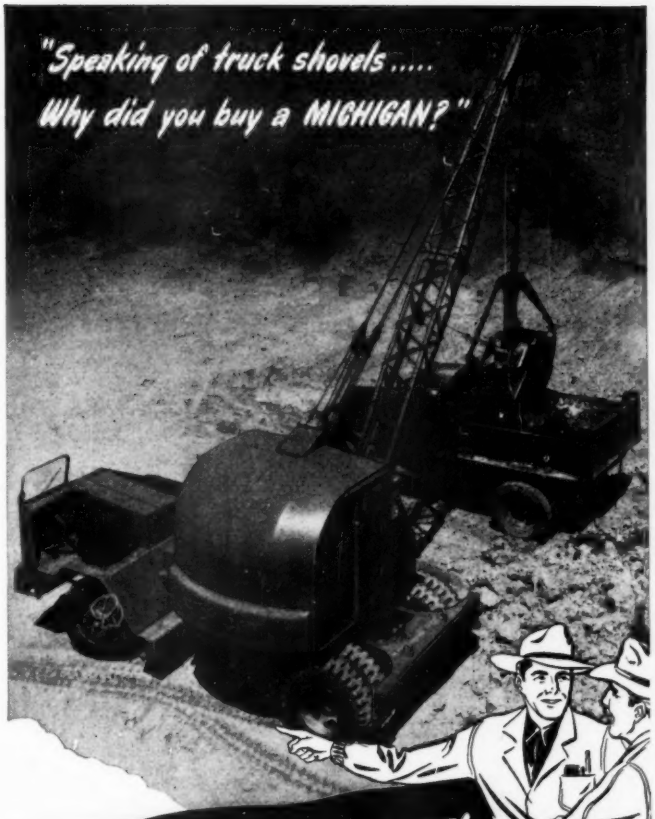
Van Buren County, Bangor Township: Harris Oil Co. 1 Springett, C W½ NE NE 5-2s-16w, Traverse 1,039 ft., 5 bbl., TD 1,057 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Lee Township: Harris Oil Co. 2 Malmstrom, SW NW NW 19-1n-15w, Traverse 1,163 ft., dry, TD 1,173 ft.

Valley Township: Ohio Oil Co. 1 Young et al, SW SW NE 10-2n-14w, Traverse 1,390 ft., dry, TD 1,425 ft.

Mason County, Grant Township: Gordon



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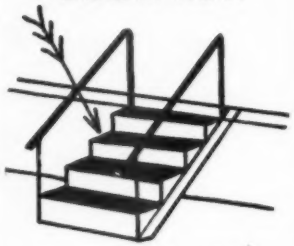

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Oil Co. 1 Fagan, NE NE SW 28-20n-17w, Monroe 1,034 ft., dry, TD 1,989 ft.
Ottawa County, Park Township: Ford Oil Co. 1 Buis, SW NW SW 3-5n-16w, Traverse 1,462 ft., dry, TD 1,562 ft.

TEXAS GULF COAST

New Oil Field for Hicksbaugh Area

HOUSTON.—A new oil field in the Hicksbaugh area of Tyler County has been opened by Humble Oil & Refining Co. B-1 William M. Rice Institute, located in T&NO Survey, Section 5. Drilled to a total depth of 10,500 ft., with perforations from 8,480-83 ft., this well flowed an initial production of 2.16 bbl. of 41.2°-gravity oil per hour through a 3/16-in. choke, and showing a gas-oil ratio of 1,358.

R. J. Caraway has opened a new gas-condensate pool north of Gobbler's Creek production in Wharton County. The 1 E. A. Weinheimer, located in the Frank Page Survey, 5 miles northwest of El Campo, flowed 4,078,000 cu. ft. of gas per day through a ¼-in. choke with flowing pressure on tubing at 2,090 psi., shut-in pressure at 2,095 psi. Open-flow calculation was 36,000,000 cu. ft. of gas per day.

Copeland Creek oil field in Polk County has been extended northward by Texas Gulf Producing Co. 1 W. A. Crum, in A. Viesca League, Abstract 77. Drilled to a total depth of 7,152 ft., with 5½-in. production string cemented at this depth, the well flowed on initial test, an estimated daily flow of 175 bbl. of oil through a 13/64-in. choke, with flowing pressure on tubing at 575 psi., casing pressure 1,425 psi. Production is through perforations at 7,118-22 ft. This well is approximately 775 ft. northwest of the Abercrombie 1 Crum discovery in the Wilcox sands.

Houston Oil Well Service Co. 1 Nancy D. Corbett, a gas discovery southwest of Spanish Camp in Wharton County, reports an open-flow potential of 36,000,000 cu. ft. of gas daily. Shut-in pressure is 1,143 psi. Total depth is 4,515 ft., with perforations from 3,003-3,008 ft. On a ¾-in. choke the well flowed 1,716,000 cu. ft. of gas per day with flowing pressure on tubing at 1,117 psi.

Amerada Petroleum Corp. 1 H. A. Godejohn, a wildcat discovery in the Fostoria area of Montgomery County, flowed 2,427,000 cu. ft. of gas per day through a ¼-in. choke with flowing pressure on the tubing at 2,043 psi. Open flow was 38,000,000 cu. ft. gas daily. Shut-in pressure is 2,102 psi.

There were 38 new locations reported for Districts 2 and 3 with 5 being wildcat starts, 1 each in Fayette, Harris, Matagorda, Montgomery, and Wharton counties. Five successful exploratory tests were completed, 2 in Wharton and 1 each in Polk, San Jacinto, and Victoria while 13 wildcats were dry, 2 in Wharton, and 1 each in Bee, Brazoria, Goliad, Harris, Jackson, Jefferson, Lavaca, Matagorda, Orange, San Jacinto, and Victoria counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Polk County: New oil pool—Texas Gulf Producing Co. 1 W. A. Crum, A. Viesca Lge. A-77, Goodrich area, approximately 775 ft. NW of Abercrombie 1 Crum discovery, TD 7,150 ft., top sand 7,118 ft., perf. 7,118-22 ft., IP: 171 bbl. oil per day through 3/16-in. choke, GOR 634, TP 575 psi., CP 1,550 psi., grav. 39.6°.

San Jacinto County: New gas-condensate discovery—Floyd L. Karsten 1 E. Malick, in S. Lusk Sur. A-196, 3 mi. S of Mercy production, TD 8,683 ft., top sand 8,644 ft., Wilcox, perf., 8,644-56 ft., IP: flowed gas and condensate and was shut in, SIP 2,875 psi.

Victoria County: New oil pay, Victoria field—Scurlock Oil Co. 1 H. E. Diebel, in Victoria 4 Lge. grant, Blk. 2, Rge. 3E, 1 mi. SE of Victoria, top pay 4,587 ft., TD 5,011 ft., perf. 4,587-98 ft., IP: 79 bbl. oil per day through 8/64-in. choke, GOR 2,180, TP 800 psi., casing sealed, grav. 27.2°.

Wharton County: New gas-condensate pool—R. J. Caraway 1 E. A. Weinheimer, in Frank Paige Sur., 5 mi. NW of El Campo, TD 5,405 ft., top sand 5,219 ft., Basal Frio, perf. 5,219-24 ft., IP: 4,078,000 cu. ft. gas per day through ¼-in. choke, open flow calculated 36,000,000 cu. ft. gas per day, TP 2,090 psi., shut-in pressure 2,095 psi.

New gas-condensate pool—Houston Oil Well Service Co. 1 Nancy D. Corbett, in R. Kuykendall Lge., 15 mi. NW of Wharton, TD 4,515 ft., top sand 3,003 ft., perf. 3,003-08 ft., IP: gas-condensate, no gage.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: J. R. Dougherty 10 R. T. Hicks, in J. M. Uranga Sur., 5 mi. SW of Normanna, dry, TD 4,515 ft.

Brazoria County: McCarthy O. & G. Corp. 1 T. J. Hudgins, in Wm. Roberts Sur., 1 mi. S of Blue Lake, dry, TD 11,338 ft.

Goliad County: Humble B-1 Powell, in D. Gilmartin Sur., A-131, 4½ mi. W-SW Charco, dry, TD 8,997 ft.

Harris County: Starr 1 C. E. Benignus, J. Jones, Sur., 3 mi. W of Springs, dry, TD 6,255 ft.

Jackson County: Lon H. Cron et al 1 Leslie D. Flowers, Lot 3, in First Registered subd., of LaWard Farms, 2 mi. N of LaWard townsite, dry, TD 8,014 ft.

Jefferson County: American Republic Corp.

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1 Mamie P. Pipkin, in T&NORR Sec. 216, and 1 mi. SE of Big Hill dome, dry, TD 12,010 ft.

Lavaca County: Adams & Haggarty 1 Louis Sobotik et ux, in J. Smothers Sur., A-47, 2 mi. W of Hallettsville, dry, TD 8,505 ft.

Matagorda County: Prince Drilling Co. 1 Mrs. M. J. Lawson, in Pleasant Pruitt Lge., A-77, 5 mi. S of Van Vleck, dry, TD 11,002 ft.

Orange County: Wood Drilling Co. 1 Melcer-Sokolski, in A. C. Barber Sur., dry, TD 8,008 ft.

San Jacinto County: Butcher-Arthur, Inc., 1 S. R. Warner, in Wm. Logan Sur., A-199, ¾ mi. NW of Cold Springs production, dry, TD 4,502 ft.

Victoria County: Johnson & Appling 1 Jas. Fuget, in V. Garcia Gr., A-45, 3 mi. SE of Inez, dry, TD 6,257 ft.

Wharton County: H. B. Hebert et al 1 J. D. Hudgins, Martin Allen Sur., 2 mi. E of Wharton, dry, TD 6,212 ft.

Standard Oil Co. of Texas 1 Frank Chovanec, in BBB&C Sec. 1, A-80, 1 mi. N of Hillje, dry, TD 6,212 ft.

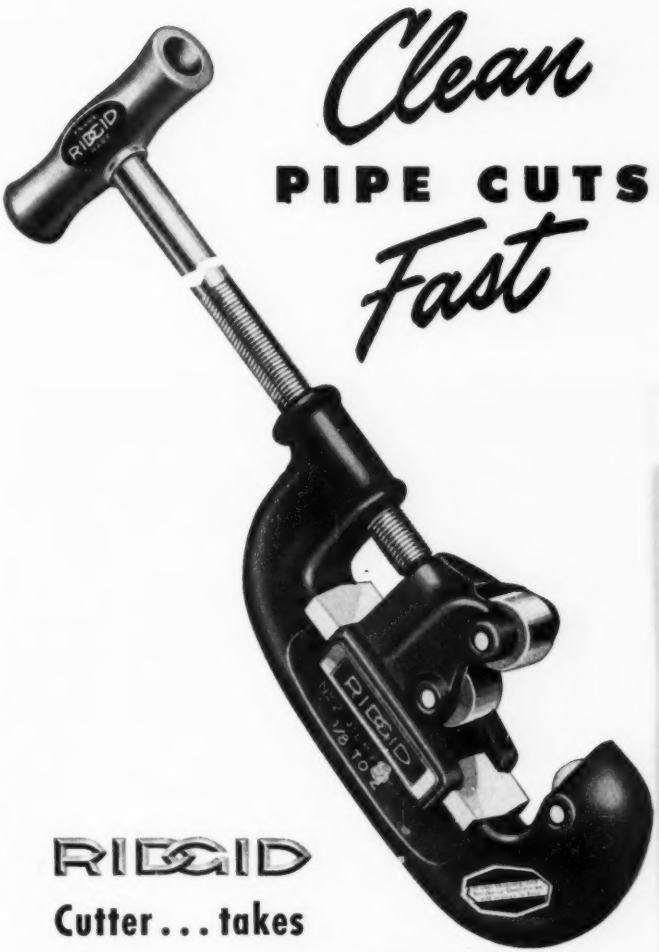
ROCKY MOUNTAIN

Utah Shows Possibilities Of Oil Production

DENVER.—Attention was again called to oil possibilities in Utah with recovery of oil from a shale zone at the Carter Oil Co.-Stanolind Oil & Gas Co. 1 Ute Tribal, C NW SW 21-1s-1e, Uintah County, Utah. The well is located on their Roosevelt block, purchased jointly by the operators at Uinta and Ouray Indian Agency sale for $67,500 last year. The test was made between 8,762-74 ft., and in 4 hours the zone made 3,000 ft. of highly gas cut, blackish-brown 26°-gravity oil and 300 ft. of gas-cut mud. This shale zone had shown saturation in cores prior to testing. The wildcat is in lower Green River (Tertiary) formation and the only top reported for the well is base of Duchesne River and top of Uinta at 1,220 ft. The 4,085-acre block is west of Carter's Vernal Unit, where four Tertiary dry holes have been drilled during the past 2 years, and in an area where both Carter and Stanolind have done extensive seismic work. The California Co., Phillips Petroleum Co., Sinclair Wyoming Oil Co., and others have acreage in this general area. Carter has been the most active operator in the Utah section of the Uintah basin, west of Rangely field in Colorado. It is estimated that Carter has more than 1 million acres of fee and federal land leases throughout this basin.

Barnsdall Oil Co. et al recovered 430 ft. of 23°-gravity black oil on drill-stem test in the Tensleep at its Lake Creek wildcat, Hot Springs County, Wyoming, which will apparently be a discovery in that formation. The well is 1 Unit, C SW NE 14-43n-92w, 4 miles northwest of Lake Creek field producing wells. Tensleep was topped at 3,548 ft. (sample) and a core between 3,554-74 ft. showed 2 ft. of medium-grained saturated sand and 18 ft. of hard, tight dolomitic sand with slight saturation. On 2-hour drill-stem test at 3,546-74 ft. the well made 451 ft. of 23°-gravity oil and 37 ft. of mud through ½-in. choke. A drill-stem test in the top of the Tensleep between 3,546-54 ft. showed 366 ft. of oil and 40 ft. of mud. Saturation was also encountered in the Phosphoria in this well, but drill-stem tests showed only mud. Barnsdall, Sohio Petroleum Co., and Pacific Western Oil Corp. have acreage within the unitized block. Oil is produced in the Phosphoria in Lake Creek field proper.

Superior Oil Co. is now below 19,800 ft. on its Pacific Creek wildcat at 1 Unit, SW NE SW 27-27n-103w, Sublette County, Wyoming, and it is reported the operator will run casing at around 20,000 ft. Seven-in. casing has been delivered at the well. There is no report of formations drilled



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nor tests on this wildcat, which passed the world's depth record at 18,734 ft.

Tests in the Newcastle at Bay Petroleum Corp. 1 Lottie Long, C NE NE 8-4n-66w, Lodgepole area, Weston County, Wyoming, showed only 40 ft. of oil-cut mud and the operator is now drilling ahead for the Dakota formation. Newcastle was topped at 6,551(?) ft., and the test was made between 6,548-66 ft. with tool open 22½ minutes. The operator had cored saturation in the sand prior to testing. This well is 1 mile northwest of Bay's Dakota sand discovery well in this area, drilled last year. After extended tests and reworking, the latter well made only a small amount of oil and is considered noncommercial in that formation.

In Colorado, Champlin Refining Co. abandoned its wildcat in the Brush Creek area at 1 Black, NE SW NE 4-5s-84w, Eagle County, at 6,321 ft., total depth. The wildcat was the company's first in the Rocky Mountains, and was drilled on surface evidence in the area. No formation tops have been reported for the test, pending further correlation of logs. There has been no previous drilling in this general area of the State.

WILDCAT FAILURE IN WYOMING

South Fiddler Creek, Weston County: Kingwood Oil Co. et al 1 Government, NW NW NE 15-45n-64w, 4,730 ft. TD, abnd., Newcastle 4,403 ft.

WILDCAT FAILURES IN COLORADO

Fountain Dome, El Paso County: C. H. Trickett 1 Jamison, 500 E/W on S line 11-17s-65w, 2,300 ft. TD, abnd.

Berthoud, Larimer County: Olds Oil Co. 1 fee, NE NE NE 20-4n-69w, 4,011 ft. TD, abnd, Frontier 3,126 ft., Dakota 3,777 ft.

WILDCAT FAILURES IN WYOMING

Conrad Midway area, Pondera County: Morris Oil Co. 1 Scott, NW SW NW 12-27n-2w, 1,634 ft. TD, abnd., Sunburst 1,579 ft., Yellow 1,616 ft.

Primitive Dome, Rosebud County: Primitive Oil Co. 1 Heckler, NW NW NW 6-11n-34e, 2,561 ft. TD, abnd.

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ILLINOIS

New Aux Vases Sand Pool Found in Hamilton County

MATTOON.—Discovery of a new Aux Vases sand pool between the Mill Shoals field to the north and the Bungay Consolidated area to the southwest, in Hamilton County, is indicated by results of a drill-stem test in Illinois-Mid-Continent Co. and Aurora Gasoline Co. 1 A. M. Thomas, SW SE SW 12-4s-7e. Test was made at 3,338-45 ft. with the tool open 2 hours. Gas showed in 20 minutes, and 3,200 ft. of clean oil and 20 ft. of oil-cut mud was recovered. No water appeared. Casing (5½ in.) has been run to 3,338 ft. The well is about a mile from production of the Bungay Consolidated area.

George & Wrather, Barclay Oil Co. and associates 1 Garrison, NE NW NE 3-7s-10e, new pool opener located about a mile east of production in the Concord Central pool, White County, swabbed 15 bbl. of oil per hour natural in initial production tests of the Waltersburg sand at 2,154-64 ft. (elevation 365 ft.). Testing is through open hole with 5½-in. casing on top the sand.

On the west side of the north end of the Centralia field, Clinton County, Dirickson-Talbot and associates 1 K. M. Snider, a deep exploratory test, encountered good showings in the Trenton sand at 4,008-30 ft. Testing is under way following an acid treatment of 3,000 gal. Total depth is 4,053 ft. with surface elevation of 480 ft.

As a possible link between the Inman pool to the southwest and the North Inman pool to the northwest, a new productive area in Gallatin County, has been opened by C. E. Skiles and Aurora Gasoline Co. in their 1 Michel Lawler, SE SW SE 13-8s-9e. Testing the Tar Springs sand at 2,134-54 ft. with total at 2,942 ft. (elevation 366 ft.), the well made an estimated 20 bbl. of oil and 100 bbl. of water per day.

ILLINOIS SUCCESSFUL WILDCATS

Clinton County: E. J. Goldschmidt 1 Goldschmidt, SE NW NE 17-3n-2w, IP 17 bbl., Benoist 1,175-85 ft., TD 1,185 ft.

Richland County: Sun Drilling Co. 1 H. Kaltreder, NW SW SE 9-3n-10e, IP 25 bbl., Rosiclare 3,094-97 ft., TD 3,099 ft.

ILLINOIS WILDCAT FAILURES

Christian County: Ohio Oil Co. 1 Camerford, SW SW SE 25-12n-1w, dry, TD 2,719 ft.

Partlow and Cochonour 1 W. Minturn, SE NW NW 14-14n-1e, dry, TD 2,417 ft.

Effingham County: Walter Duncan 1 D. Blink, SE NE SW 36-6n-7e, dry, TD 3,006 ft.

Gallatin County: N. V. Duncan and Aurora Gasoline Co. 1 Switzer SW NW NW 35-7s-9e, dry, TD 3,090 ft.

George & Wrather Drilling Co. 1 C. O. Flanders, SW SE NE 3-8s-8e, dry, TD 2,660 ft.

Madison County: George Cassens 2 H. Albricht, NE NE SE 24-6n-7w, dry, TD 676 ft.

J. Carlson 1 Meyers, SE SE SW 24-6n-7w, dry, TD 1,001 ft.

Macoupin County: J. Castle 1 Butcher, NW NE SW 17-12n-9w, dry, TD 1,577 ft.

Marion County: H. Luttrell 2 Howell, NW SW SW 20-4n-3e, dry, TD 1,456 ft.

Shelby County: National Associated Petroleum Co. 1 L. C. Compton, SW SE NW 21-10n-4e, dry, TD 1,885 ft.

Wabash County: Illinois Mid-Continent Co. 1 Brown and Alka, SW SW NW 33-1n-13w, dry, TD 2,762 ft.

White County: George Engle et al 1 E. Holderby, NE NE SW 20-5s-10e, dry, TD 2,850 ft.

B. M. Heath 1 E. Kimball, SE NE SW 24-7s-10e, dry, TD 2,926 ft.

PERMIAN BASIN

Magnolia Gets Discovery Near Dollar Hide Field

MIDLAND.—Magnolia Petroleum Co.'s 18-B Cowden, SW NW 3-A55-PSL, Devonian and Silurian discovery 2½ miles southeast of Dollar Hide field, southwestern Andrews County, had total depth at 11,244 ft., and prepared to set casing. The wildcat had top of the Fusselman section at 11,000 ft., and on its last drill-stem test had found the water table. The 5-hour test, from 11,085-121 ft., using 2,250 ft. of water blanket, had gas in 3½ hours and recovered the water cushion, 1,275 ft. of clean oil, plus the same amount of sulfur water.

Scurry County.—Rig was being moved one location north from J. L. Collins et al 1 G. E. Parks, 442-97-H&TC, Strawn discovery 1¼ miles east of Canyon production in North Snyder field. The 1 Parks flowed 512 bbl. of 41.6°-gravity oil in 25 hours on a drill-stem test at 7,308-22 ft., total depth. Then with packer at 7,313 ft., it flowed 1,110 bbl. of oil in 48 hours.

Magnolia Petroleum Co. 1 A. B. Eicke, 209-97-H&TC, Canyon prospect 1½ miles northwest of its 1 H. G. Moore, was being swabbed to test after swabbing and flowing 11 bbl. of oil in 4 hours. Total depth was 6,778 ft.

Hiawatha Oil & Gas Co. 1 L. M. Wilson, NW NW 183-97-H&TC, prospective southeast extension to Diamond M. Canyon field, cored from 6,750-61½ ft., recovering 7½ ft. of lime with good fluorescence and odor, and 6 in. of black shale. A drill-stem test was then made to bottom of core hole, with packer at 6,746 ft. Open 1 hour and 20 minutes, it produced gas in 5 minutes and recovered 180 ft. of oil and gas-cut drilling mud, plus 6,200 ft. of clean oil with no water. Operators reamed to bottom, ran electrical surveys and prepared to set pipe for production tests.

Upton County.—Six miles north of the Upton County portion of Benedum multiple-pay area, Humble Oil & Refining Co. 1 Pembrook, Ellenburger test in Block X, C. C. DeWitt Survey, was drilling ahead below 6,328 ft. in sandy lime and shale after recovering 576 ft. of drilling mud cut with salt water, and no shows of oil, on a 2-hour drill-stem test of the Clear Fork at 6,072-6,190 ft. Field reports indicated oil and gas shows while drilling at that depth.

Slick-Urschel 1-B Elliott, NW NE 46-CCSD&RGNG, ⅜ mile northeast of Plymouth Oil Co. 1-47 Gordon, completed Ellenburger well, flowed 276 bbl. of oil on a 13-hour test early this week. The flow was through ½-in. choke from open hole between 11,339 ft. and 11,525 ft., total depth. Top on the Ellenburger was 11,460 ft.

Reagan County.—On the southeast flank of Benedum field, Plymouth Oil Co. 1-B Taylor & Sadler, Lot 4, Section 50½, P. B. Scott Survey, had prospects of additional Wolfcamp pay. A 3-hour drill-stem test from 8,416-8,836 ft. had gas at the surface in 15 minutes and recovered 1,140 ft. of clean, 38°-gravity oil, plus 300 ft. of drilling mud. Drilling continued below 8,920 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Borden County: H. L. Hunt 1-B Clayton & Johnson, NW NW 22-31-T6N-T&P, 10 mi. NW Gail, pumped 40 bbl. of 41°-grav. oil, 15 bbl. water, Sprayberry sand 5,730-45 ft., TD 5,760 ft., elev. 2,626 ft.

H. L. Hunt 1 Clayton & Johnson, SW NW 24-31-T4N-T&P, 6 mi. S Gail, pumped 19 bbl. oil a day, Wolfcamp 6,490-96 ft., TD 8,015 ft., South Gail field discovery.

Seaboard Oil Co. and Pan American Production Co. 1 T. J. Good, 1,985 ft. from S line, 2,004 ft. from W line, 37-33-T4N-T&P, 6 mi. NW Vealmoor field, flowed 448 bbl. 41°-grav. oil a day, ¼-in. choke, GOR 675 cu. ft., TP 900 psi., CP 900 psi., Canyon lime 7,910-8,010 ft., TD, elev. 2,613 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Andrews County: Amerada Petroleum Corp. 1-A Andrews-University, 15-1-University, 15-1-University Lands, 8 mi. SE Andrews, dry, TD 4,820 ft., Yates 3,115 ft., Grayburg 4,670 ft., elev. 3,117 ft.

Crockett County: C. U. Bay and Vickers Petroleum Co. 1-39 University, SW SW 4-39-University, 15 mi. NE Midway Lane field, dry, TD 8,500 ft., Ellenburger 8,170 ft., DST recovered gas-cut sulfur water, elev. 2,610 ft.

Sun Oil Co. 2 Halff-Bivins Estate, 54-1-I&GN, 4 mi. W Clara Couch field, dry, TD 2,291 ft.

Gaines County: C. H. Murphy & Co. 1 E. T. O'Daniel, NE SE 16-C44-PSL, 2 mi. SE Seminole, dry, TD 5,450 ft., anhydrite 2,130 ft., Yates 3,250 ft., San Andres 5,000 ft., elev. 3,268 ft.

Lamb County: Pacific Western Oil Corp. 1-B D. L. Brown, 440 ft. from N & E line, Labor 5, Lge. 213, Deaf Smith CSL, 8½ mi. SW Sudan, dry, TD 8,135 ft., San Andres 3,190 ft., Glorietta 4,500 ft., Clear Fork 5,090 ft., Pennsylvanian 7,820 ft.

Mitchell County: Richardson & Bass 1 J. H. Nail Est., NE NE 39-12-H&TC, 13 mi. S Loraine, dry, TD 7,675 ft., Ellenburger 7,322 ft., elev. 2,177 ft.

Motley County: Humble Oil & Refining Co. 1 Matador Land & Cattle Co. "H," SE SE Sec. 128, Blk. M, Matador Cattle CSL, 16 mi. E Matador, dry, TD 8,616 ft. in pre-Cambrian.

Pecos County: Hunt Oil Co. 1 Elsinore Ranch, 3-C-GC&SF, 7 mi. E Chancellor, dry, TD 2,459 ft.

SOUTHEASTERN NEW MEXICO

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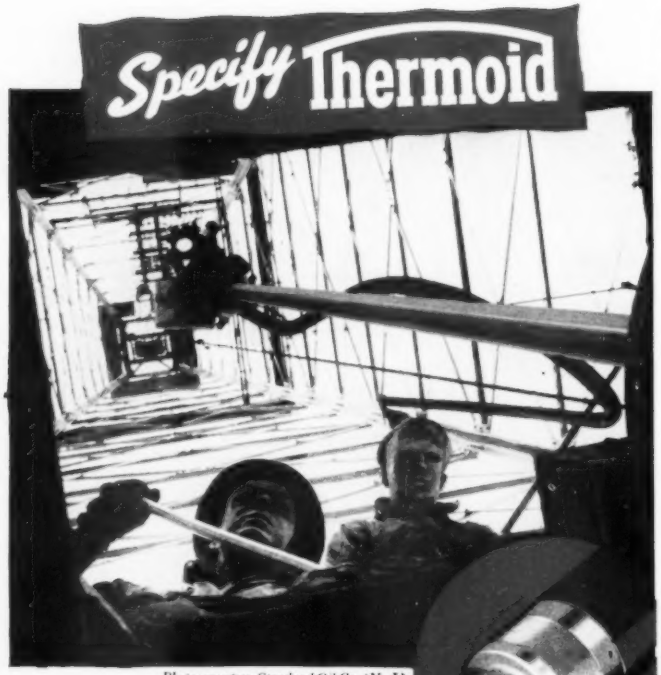

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prospect this week as Humble Oil & Refining Co. 1-X State, NW NE 31-11s-35e, unloaded oil and gas emulsion, with some clean oil, following a drill-stem test.

A 1-hour test was made at 10,047-88 ft., using 1,700 ft. of water cushion. It produced a good blow of air at the start which died by the end of the hour. The well did not flow but drill pipe started unloading after 20 lengths had been pulled. High winds whipped the oily fluid over the equipment and it was necessary to reverse circulation. Total recovery was estimated at 9,500 ft. of frothy oil and gas-cut mud and clean oil. Operators were not satisfied with the test and conditioned mud for another try.

Location of the 1-X State is 8 miles east and 1 mile north of Amerada Petroleum Corp. 1-BTA, Pennsylvanian and Devonian discovery, and about 8½ miles northwest of the town of Tatum.

Magnolia Petroleum Co. 1 Betenbaugh, Pennsylvanian discovery 5 miles northwest of Crossroads field, was swabbed dry, then acidized perforations at 9,617-35 ft. with 1,000 gal. of mud acid, and kicked off after the swab was run once. At last report it was flowing out load oil.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: E. F. Moran, Inc., 1-A State, 14-25s-27e, dry, TD 2,733 ft., salt 1,440-2,021 ft., Delaware lime 2,215 ft., sand 2,262 ft., elev. 3,097 ft., salt water at 2,300 ft.

Wright & Etz 1 Yates, SE SE SW 6-20s-27e, dry, TD 997 ft., show of oil 313-15 ft.

LA.-ARK.

Gas-Distillate Production Extended at Cotton Valley

SHREVEPORT — A 1-mile southeast extension of Cotton Valley gas-distillate production was definitely established at Southwest Gas Producing Co. 1 W. I. Burgess, approximately CNE 8-20n-4w, Lincoln Parish, when the well flowed 25,000,000 cu. ft. of gas daily, plus 12 bbl. of distillate and 8 bbl. of salt water per 1,000,000 cu. ft. of gas. The flow was gaged through 20/64-in. tubing choke, under pressures of 650 psi. on tubing and 1,000 psi. on casing. Final perforations were from 8,680-8,700 ft., and acidized.

Considerable work has been done on perforations at 8,684-8,708 ft., which made several gas-distillate flows, then died. Earlier reports indicated the well was making excessive salt water and was to be abandoned. Plans for final completion had not been announced.

Bossier Parish.—Barnsdall Oil Co. 1 Ardis, 27-22n-11w, was coring below 9,945 ft. in the Cotton Valley. Two feet of shaly sand with gas odor was recovered from 9,739-46 ft., and the remainder lime with no shows.

D.E.M. Oil Co. 1 Sentell, 30-22n-13w, 3,000-ft. Paluxy test, was drilling at 2,260 ft.

Caddo Parish.—Phillips Petroleum Co. 1 Ellerbe, 17-15n-12w, had total depth at 9,014 ft. and was testing. A drill-stem test at 8,890-8,910 ft. recovered 8,000 ft. of salt water and was squeezed. Two other tests on new perforations at 8,890-98 ft. and again at 8,562-80 ft., recovered water and mud with no shows. Operators prepared to reperforate.

Ouachita Parish.—The California Co. 1 Brown Paper Mill, 10-16n-3e, was shut down for orders at 10,530 ft. in the Cotton Valley. Last cores from 10,368-517 ft. had hard, tight sand; lime and shale with no shows.

Sabine Parish.—Union Oil Co. of California 1 Long Bell, 35-7n-13w, was testing with total depth at 6,011 ft., in the Glen Rose. A drill-stem test of perforations from 5,740-48 ft., and packer at 5,730 ft., recovered 5,200 ft. of salt water slightly cut

with gas and having a scum of oil. The tool was open 2½ hours. A second test of the same interval and packer setting, with new perforations, produced 5,400 ft. of salt water with a slight show of oil.

NORTH LOUISIANA WILDCAT FAILURE

Caddo Parish: Fields and Pickens 1 Sentell, 23-19n-14w, dry, TD 8,508 ft., Pettit 5,405 ft., Travis Peak 5,577 ft., Cotton Valley 7,721 ft., sand 8,700-50 ft., Davis 8,432-50 ft., Bodcaw shaled out, elev. 185 ft.

ARKANSAS WILDCAT FAILURE

Madison County: J. V. McCallister 1 Ray Smith, 28-15n-27w, dry, TD 550 ft.

SOUTHWEST TEXAS

New Pay Zone in East Plymouth Field

CORPUS CHRISTI.—A new oil pay zone in the east Plymouth field of San Patricio County has been opened by Texon Royalty Co. 2 W. L. Roots. On potential gage it flowed 95.98 bbl. of oil per day through a 7/64-in. choke through perforations at 5,129-37 ft. Tubing pressure was 580 psi., and casing pressure 1,000 psi. The oil was 29.5°-gravity, and no water in the flow. Total depth is 5,645 ft., with 5½-in. casing set to 4,945 ft.

W. L. Goldston 2 Ed Canales, new discovery just northwest of Chiltipin field, Duval County, flowed on initial test 96 bbl. per day through 7/64-in. choke, with 650 psi. tubing pressure, 800 psi. casing pressure, with gas-oil ratio of 1,000. Production is through perforations at 4,151-55 ft. Total depth is 4,706 ft., and is located in SA&MG Survey 2, 12 miles northwest of San Diego.

Magnolia Petroleum Co. 1 J. A. Murray, in A. J. McCall Subdivision, in Porcion 68, 3 miles southwest of Edinburg, has opened a new gas-condensate pool, flowing a potential gage of 46 bbl. of condensate and 5,600,000 cu. ft. of gas per day through an 11/32-in. choke, with gas-oil ratio of 121,000, tubing pressure 2,330 psi. Gravity is 53.2°. Production is through perforations at 7,587-7,624 ft. Total depth is 8,607 ft.

Gas-condensate production has been indicated on drill-stem test at Humble Oil & Refining Co. 1 R. J. Kleberg, Trustee, 7 miles east of Encino and 7 miles northeast of Rachal, in Brooks County. On drill-stem test, open 25½ minutes through ¼-in. chokes, 8,123-35 ft., it developed 103-psi. working pressure and recovered 2 gal. of condensate plus 30 ft. of mud. This well is in San Quiteria Grant. Operators are coring ahead below 8,250 ft.

Humble G-1 King Ranch-East Laureles, wildcat in Kleberg County, 5 miles west of Bird Island field, on a 22-minute drill-stem test from 6,428-42 ft., using ¼-in. chokes, recovered 170 ft. of condensate-cut mud, with 210-psi. working pressure. Test at 6,487-99 ft., ¼-in. chokes, and open 20½ minutes, developed 181-psi. working pressure, and recovered 170 ft. of condensate-cut mud. Test at 6,505-11 ft., open 24 minutes, ¾-in. chokes, recovered 10 ft. of gas-cut mud with 194-psi. working pressure. Operators are coring ahead below 6,770 ft. This well is in the Rincon de los Laureles Grant, 660 ft. south of the Nueces-Kleberg county line.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Hidalgo County: Extension and new pay, Cecil field—Clark Fuel Producing Co. 2 Bemis Daskam et al, in Lot 27, Porc 45, top pay 4,253 ft., TD 4,272 ft., perf. 4,259-62 ft., IP: 4 bbl. oil per day through ¼-in. choke, GOR 48,134, TP 160 psi., CP 450 psi., grav. 45.2°, no water.

San Patricio County: New oil pay, East Plymouth field—Texon Royalty Co. 2 W. L. Roots, in Lot 4, Sec. 26, 4th Addn. Taft Farm lands, TD 5,645 ft., top pay 5,130 ft., perf. 5,129,37 ft., IP: 95 bbl. oil per day through 7/64-in. choke, TP 580 psi., CP 1,000 psi., grav. 29.5°.

Starr County: New oil pay, La Copita field—Humble 1 J. J. Howell, CCSD&RGNGRR Sur. 551, top pay 6,798 ft., TD 7,007 ft., perf. 6,798-6,834 ft., IP: 47 bbl. oil per day through ¼-in. choke, GOR 8,320, TP 375 psi., casing sealed., grav. 43°.

New pay, La Copita field—Rowan & Hope 2 Bentsen Bros. Sur. 549 (dual completion), top pay 4,844 ft. (Frio "B" sand) new sand) perforations 4,846-54 ft., IP: 97 bbl. oil per day through ⅛-in. choke; and top pay 4,897 ft. (Frio "C" sand), perf. 4,899-4,903 ft., IP: 102 bbl. oil per day through ⅛-in. choke, GOR 840, TP 1,025 psi., grav. 45°. TD 4,950 ft.

New oil pays, La Copita field—The Texas Co. 2 Martinez-State, (dual completion), top pay 6,564 ft., perf. 6,563-69 ft., IP: 268 bbl. oil per day through 12/64-in. choke, top pay 6,635 ft., perf. 6,735-53 ft., IP: 22 bbl. oil per day on gas lift, GOR 4,000. TD 7,208 ft.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Caldwell County: C. W. Voyles & Byrd Oil Co. 1 J. C. Taylor, in John Bell Sur. A-41, 5 mi. NE of Lockhart, top Edwards lime 1,707 ft., dry, TD 1,750 ft.

Duval County: Flowers & Ward Oil Co. 1 Dolores Garcia, in Santa Cruz de Con-

cepcion Gr., 1¼ mi. E of Sejita field, dry, TD 1,180 ft.

W. T. Grubb & R. N. Ranger 1 W. E. Smith, in Santos Garcia Gr., ½ mi. NE of Realitos, dry, TD 5,524 ft.

San Patricio County: Curtis Singleton Drilling Co. 1 Walter F. Timon, in San Patricio de Hiberni town tract 2121, 8 mi. SE of Mathis, dry, TD 5,840 ft.

Starr County: Geo. H. Echols 1 Thos. Flaxman, in Sur. 346, 2½ mi. E-NE of Jay Simmons field, dry, TD 8,518 ft.

Travis County: M. G. Smith 1 D. H. Ammonds, in J. A. Navarro Sur., dry, TD 860 ft.

James E. Smith 1 Ernest Acklin, in Calvin Barker League 38, 1½ mi. E of Manor, dry, TD 1,107 ft., Top Eagleford 1,070 ft.

Zapata County: John F. Camp & Sons 2 Gutierrez & Flores fee, Share 3, Charco Redondo Gr., dry, TD 942 ft.

APPALACHIAN FIELD

Randolph County Wildcat Finds Second Oriskany

PITTSBURGH.—In New Interest district, Randolph County, West Virginia, South Penn Oil Co.'s wildcat, 1 J. W. Isner, elevation 1,973 ft., reported a second section of the Oriskany sand at 3,045 ft., probably due to a folding fault. The first section was at 1,730-1,864 ft. Drilling has reached a depth of 3,810 ft. In Portland district, Preston County, Nollem Oil & Gas Co.-Snee & Eberly 1 H. R. & J. A. Fitzpatrick, elevation 2,228 ft., are still fishing at a depth of 3,790 ft. In this same district, Hope Natural Gas Co. 2-9331 J. Paul Martin, elevation 1,898 ft., is cementing cavings in the hole at 4,700 ft.

In Unity Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 1-3830 William Piper, elevation 2,061 ft., logged the Onondaga chert at 8,158 ft. Drilling has been shut down at 8,159 ft. to run casing. In Derry Township, its 4-3814 Camilla Giffin is drilling at 8,591 ft. In Napier Township, Bedford County, South Penn et al-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 3,200 ft.

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OHIO, KENTUCKY

Perry County Successes Mark Week's Operations

COLUMBUS.—R. B. Weed et al 1 G. D. Aichele, Section 33, Harrison Township, Perry County, a west offset to the 1 McCaslin, filled up 1,200 ft. with oil while drilling through the sand, and made 70 bbl. in 36 hours after a 90-qt. shot. Clinton sand was reported at 3,683-3,729 ft.

In the Baker pool in southern Hopewell Township, Perry County, the Four Way Oil & Gas Co. 2 Dora Swinehart, Section 34, reached the Clinton at 2,885 ft. and drilled in with a show of gas and a nice showing of oil natural. In 24 hours after a 90-qt. shot, the well made 140 bbl. The Preston Oil Co. 1 H. C. Albert, Section 34, a location to the west, has been drilled in and a good showing of oil is now being tested.

The east extension of Clayton pool was moved a location further east. The Quaker State Oil Co. 9 J. Adrain, Section 11, Clayton Township, Perry County, found the Clinton at 3,424-81 ft. with 30 bbl. natural. The well was shot with 130 qt. and made 132 bbl. in the first 24 hours.

R. B. Weed et al 1 H. A. Schwartz, Lot 26, Aurora Township, Portage County, showed some oil and gas natural in the red Clinton at 3,997-4,060 ft. Production after shot is not settled yet, but it looks like a fairly good producer.

Pure Oil Co. 4 Myrtle Frazier, Lot 15, Jackson Township, Muskingum County, shot in the Clinton, found at 3,043-3,101 ft., made 101 bbl. in 24 hours.

OHIO WILDCAT FAILURES

Pike County, Scioto Township: E. O. White et al 1 Wm. Armintrout, Sec. 17, St. Peter 3,017 ft., dry, TD 3,430 ft.

Stark County, Sandy Township: East Ohio Gas Co. 1 W. Garaux, Sec. 17, Clinton 4,932-5,048 ft, TD 5,113 ft.

EASTERN KENTUCKY

ASHLAND.—Van Everman et al was drilling at 1,475 ft. at 1 George Stevens, 8-V-79, wildcat test for central Carter County. Previously Corniferous lime had been topped at 1,425 ft. with only a small show of heavy black oil. Drilling will probably be continued to the Big Six sand horizon.

In Johnson County, 19-R-79, Ashland Oil & Refining Co. was drilling at 4,673 ft. at 8 Wallace Williams, a Knox dolomite wildcat test and the only one drilling at the present time in the general area.

WESTERN KENTUCKY

OWENSBORO.—Located about 1½ miles southwest of the Bells Run pool and about the same distance north of the Pleasant Ridge pool, in Ohio County, J. M. Murphy and George Wakefield 1 E. M. Hunt, 17-N-31, is giving indications of linking the two areas. In the Cypress sand at 974-82 ft., with total depth at 982 ft., the hole filled up 500 ft. with clean oil and is bailing about 3 bbl. per hour with cable tools. The location, only a short distance east of the Daviess County line, also is only a few miles east of the Cane Run pool.

The new Waitman pool, in Daviess County, opened in April, is getting its second well in the McClosky lime, the discovery pay zone, and also a third well, which opens a new pay, the Cypress sand. C. E.

Skiles, who discovered the pool in his 1 R. F. Kelley, SE SW NW 8-Q-31, which pumped 60 bbl. of oil per day from the McClosky at 1,312-15½ ft., has completed the second well, 1 James Bowlds, SE NW NE 8-Q-31, in the same pay at 1,242-44 ft. It pumped 100 bbl. of oil per day after acidizing with 3,000 gal.

INDIANA

EVANSVILLE.—Carter Oil Co. has another good McClosky well on the west side of Spencer pool in the southern part of Posey County. Carter 1 Hanshoe, SE SW NE 11-8s-14w, swabbed and flowed 197 bbl. in 11 hours and after treatment with 3,000 gal. of acid, flowed 127 bbl. the first hour, 111 bbl. the second hour, and 92 bbl. the third hour. Pay is at 2,869-76 ft. and total depth is 2,883 ft. This is the sixth oil well for the pool which was opened last November by V. Gallagher 1 Spencer, NW SW NW 12-8s-14w, with an initial production of 1,137 bbl. per day.

In Vigo County, G. H. Froderman is preparing to test the Devonian at 1 Royse, NW NE SE 9-11n-9w. From an elevation of 488 ft. the Devonian zones to be tested are at 1,680-86 ft. and 1,690-1,710 ft. Total depth is 1,752 ft. The new well is about 2 miles northwest of Spring Hill pool which was opened last November with an initial production of 200 bbl. from the Devonian.

INDIANA WILDCAT FAILURES

Hamilton County: F. B. Cline 1 Joel Hayworth, SW SW NW 8-19n-4e, dry, TD 995 ft.

Sullivan County: D. W. Drake 1 M. Moore, NE NW NE 10-9n-9w, dry, TD 200 ft.

Vanderburgh County: Calvert & Willis and Aurora Gasoline Co. 1 J. Brandis, NW NW SW 34-6s-11w, dry, TD 2,537 ft.

CANADIAN FIELDS

Socony-Vacunum Reenters Craigmyle Area

CALGARY.—Socony-Vacuum Exploration Co. has reentered the Craigmyle area to continue its search for Madison lime oil, following up its 1948 wildcat which showed high promise of an oil discovery in a drill-stem test about 5 months ago. Socony's first well was later abandoned after continuing for lower Devonian objectives, as nothing commercial was found in the horizons below, and efforts to place the well on production from the upper Madison formation were unsuccessful.

The new venture, Socony-Craigmyle 2, LSD 9, 31-32-16w4, is located ¼ mile due west of the encouraging No. 1 test. Objective is top of the Madison limestone, somewhere around 4,000-4,100 ft. Drilling is expected to get under way in the near future.

Campbell.—Redwater Leaseholds, Ltd., of Calgary obtained oil encouragement at its first Alberta wildcat, Redwater-Leaseholds-Campbell 1. Drill-stem test in the Lower Cretaceous from 3,704-17 ft. gave a 480-ft. rise of clean oil with no sign of water in 1 hour. A further test from 3,753-84 ft. gave a pipe recovery of 80 ft. of gas-cut mud, no water. Coring is now continuing below 3,784 ft.

The well, located in LSD 1, 28-54-25w4, is about 8 miles northwest of Edmonton and around 20 miles north of the Leduc-Woodbend and Whitemud Lower Cretaceous oil production. It is a test of all formations down to and including the D3 zone of Devonian.

Woodbend.—Home Oil Co., Ltd., of Calgary has commenced drilling operation at a wildcat about 4½ miles northeast of the Imperial Schoepp 1 Golden Spike oil discovery and about 3½ miles northwest of current Woodbend production. The well, Home-Woodbend 1, LSD 4, 31-51-26w4, is located about 1¼ miles southeast of Imperial-Golden Spike No. 2 stepout test. Home,

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Pincher Creek.—Canadian Gulf Oil Co. showed a 4,500,000-cu. ft.-daily gas flow and a 5½-bbl. hourly rate of around 52° A.P.I. gravity distillate recovery during a 2-hour drill-stem test run in the Madison limestone interval 12,250-12,338 ft. at its Walter Marr well near Pincher Creek. Pressures recorded during the test were as follows: bottomhole pressure, 4,820 psi.; flowing pressure at bottom, 2,000 psi.; surface pressure, 750 psi. Crew is now continuing coring at 12,355 ft.

Gulf-Walter Marr 1, located in LSD 1, 29-4-29w4, is about 7½ miles northwest of the Gulf-Pincher Creek No. 1 well, completed as an important "wet gas" discovery last year. The Marr venture topped the Madison at 12,185 ft., 7,835 ft. below sea level and 310 ft. lower than the 7,525-ft. subsea lime elevation at the Pincher Creek No. 1 discovery. The discovery ended up with 400 ft. of variable porosity and fracturing in the Madison, and an indicated open-flow potential of around 45 million cubic feet of natural gas and over 1,500 bbl. of 53° A.P.I. gravity distillate per day.

Wildcat abandonments.—Imperial-Griesbach 1, LSD 2, 16-54-21w4, TD 4,624 ft. Texaco-Onoway 1, LSD 16, 18-54-27w4, TD 6,543 ft.

CALIFORNIA

Middle Dome Corp. Tests Eocene Well

LOS ANGELES—The Middle Dome Corp. is testing its 30V-52 semiwildcat on Kettleman Hills Middle Dome, 30-23s-19e. Preparations have been made for a substantial producer. This will be the second well completed in the Eocene on Middle Dome. Prospecting began in 1947 when Standard proved the presence of Eocene oil in its 73-30V, also in Section 30. Due to unrecoverable drill pipe in the bottom of this hole, however, it had to be redrilled and was finally brought in during January 1948, flowing at the rate of 1,000 bbl. a day of 46°-gravity oil and 20 to 30 million cubic feet of gas through an 8/64-in. choke from interval 12,072-12,280 ft. In 2 months, production had declined to 180 bbl. a day of oil and a 15 per cent water cut through a 11/64-in. choke, with 3,175 psi. on the tubing and 3,500 psi. on the casing. It is hoped that problems encountered in that well have been overcome in the new project. The latter was spudded June 22, 1948, and has therefore taken 1 week short of 11 months to drill.

Honolulu Oil Corp. has bailed some 18°-gravity oil in its 67 Arferitz, 14-25s-18e, in the Alferitz Valley, 1½ miles north of Devils Den field in Kern County. The oil is coming from the Wagonwheel formation of Oligocene age, the interval undergoing tests being between 1,970-2,505 ft. A discovery of minor importance appears likely.

General Petroleum Corp.'s new oil field discovery 3 miles west of Greeley field in Kern County has been named Calder field. The discovery well, 38 Kern County Land-Calder, 23-29s-25e, is producing 175 bbl. a day of 34.8°-gravity clean oil through a 14/64-in. choke from Stevens sand.

Kirk Oil Co. made an oil discovery ¾ mile west of South Mountain field in Ventura County. Operator's 1 Richardson Community, 14-3n-21w, swabbed for 12 hours at 140-bbl.-per-day rate of 25.2°-gravity oil, 2 per cent water cut, and was shut in. Roads are being built for 1 Alameda Richardson, 695 ft. east of the discovery.

Shell Oil Co., Inc., is preparing to drill 37 Kern County Land Co., 2¾ miles northwest of Canal field in 4-30s-25e. One-half mile to the east of this location, the company drilled a test to 13,957 ft. in 1939 and recovered 180 ft. of 34°-gravity oil on a drill-stem test of the interval 10,236-96 ft.

Bolsa Chica Oil Corp. will drill the farthest southeast wildcat yet undertaken in the Cuyama Valley. A tentative location has been made for 1 Hickey in 30-9n-24w, about 15 miles southeast of Richfield Oil Corp.'s recent South Cuyama discovery.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Greeley area: General Petroleum Corp. 38 Kern County Land Co.-Calder, 23-29s-25e, flowed 400 bbl. daily, 18/64-in. choke, gravity 35°, water cut 0.1 per cent, perf. 8,808-34 ft. in Stevens sand (upper Miocene), elev. 331 ft., TD 12,733 ft., drilled to 8,835 ft., new oil field discovery.

Santa Barbara County, Cuyama Valley area: Richfield Oil Corp. 81 Homan, 35-10n-27w, flowed 1,430 bbl. daily, ½-in. choke, gravity 34.2°, water cut 0.6 per cent, perf. 4,051-4,390 ft. in Dibblee sand of lower Vaqueros (lower Miocene), elev. 2,597 ft., TD 4,392 ft., new oil field discovery.

CALIFORNIA WILDCAT FAILURES

Los Angeles County, San Fernando area: Universal Consolidated Oil Co. 1 Panorama, 6-2n-15w, dry, elev. 1,180 ft., TD 9,614 ft.

Kern County, Tejon Hills area: Arvin Associates 1 Vaqueros, 14-11n-18w, dry, elev. 1,204 ft., TD 752 ft.

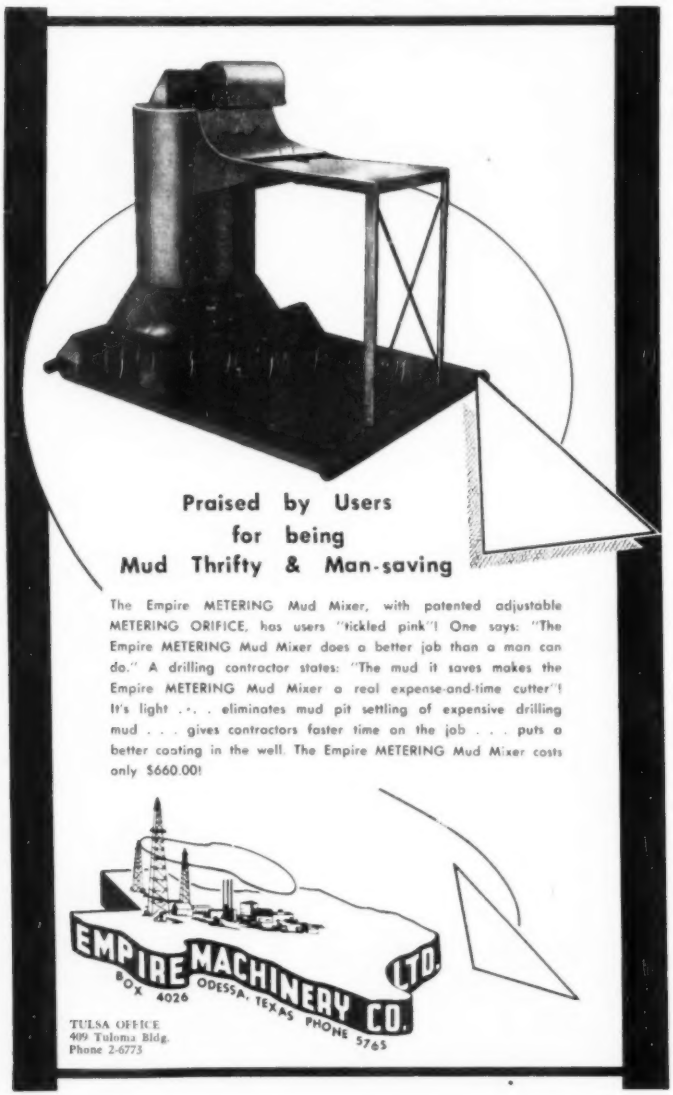
Arvin Associates 2 Vaqueros, 15-11n-18w, dry, elev. 1,085 ft., TD 691 ft.

Ewan Oil Co. 2 Ewan, 11-11n-18w, dry, elev. 1,430 ft., top granite 365 ft., TD 367 ft.

Marin County, Bolinas area: L. M. Lockhart 3-1 R. C. A., 26-1n-8w, dry, elev. 211 ft., TD 8,396 ft.

San Luis Obispo County, Soda Lake area: McCarthy Oil & Gas Co. 88-5 Pollizzotto-Cousins, dry, elev. 2,000 ft., TD 4,785 ft.

Santa Margarita area: Petroleum Holding Co. 1 Pago Grande, 2-29s-21e, dry, elev. 1,020 ft., TD 1,954 ft.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Benedum Field Is Now A Major Reserve

(Continued from page 184)

regarded not too highly, at least by some people, now begins to take on an entirely different aspect. It may turn out after further testing, that the west side of the field, once thought not too promising, may prove to be as good as the east and north sides, which have been further proven to date.

North-South Axis

On the west side of the field, the subsurface map on top of the Pennsylvanian indicates a slightly different shape from either the Fusselman or the Ellenburger. The Pennsylvanian seems to have more of a due north-south axis. It will probably produce over more area in the main field than either the Ellenburger or Fusselman, i.e., it may produce farther down the flanks of the structure. But its shape may be slightly different, more north-south and less to the west.

The sole Pennsylvanian producer west of the fault in the main field is Turner et al 1 Barnett, SE NE Section 4, GC&SF Survey. This well, which currently is the farthest north producing well in the field, is producing from five sets of perforations which take in both the Strawn and Bend sections of the Pennsylvanian. Perforations at 9,982-85 ft., 10,062-65 ft., and 10,098-10,100 ft. are in the Strawn, while those at 10,137-40 ft., and 10,177-80 ft. are called Bend.

Although this is the only well on the west side actually producing from the Pennsylvanian, pressures in that formation have been a major headache in drilling the other wells. Practically all wells drilled have had to go very cautiously in drilling through the Pennsylvanian, while en route to the Ellenburger. On top of the structure, the 1 Alford, discovery well for the field, had a good drill-stem test in the Pennsylvanian.

But on the east side of the field, on the downthrow side of a major fault (600 to 800 ft. of throw), Plymouth now has two good-looking Pennsylvanian wells. As of now, this area looks to the geologists like a separate reservoir from the west side. The discovery well in this Pennsylvanian reservoir is Plymouth 1-46 Elliott, SE SE Section 46, Block Y. On potential test, this well flowed 257 bbl. in 24 hours through a ½-in. choke. The second well is a diagonal southeast offset, Plymouth 1-50 Elliott in NW NW Section 50. On potential test, this well flowed 327 bbl. in 24 hours through a ⅜-in. choke.

The productive section of Pennsylvanian on the east side is definitely in the Bend, no production having been found in the upper or Strawn section. The maximum penetration

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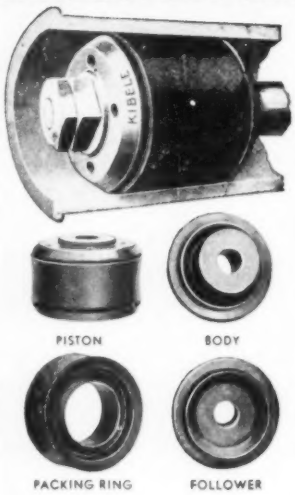
KIBELE TYPE
BOILER FEED PISTON



The "Double E" Kibele Type Piston is famous with users for LONGER SERVICE. The soft rubber packing molded from extruded tubing reduces liner wear. The form of the rubber packing ring gives an automatic seal to compensate for wear — the wiping action of the lip removes the abrasive grit so harmful to most packing and liners. A used piston assembly is made NEW by substitution of replacement Packing Ring only. This piston is highly satisfactory in core drilling pumps handling drilling muds, and when used with special Packing Ring Compounds provides excellent service in hot water. Specify your special requirements.

EQUIPMENT ENGINEERS, INC.
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DALLAS, TEXAS

into the Bend pay so far has been 88 ft. with no signs of water. Both wells were completed through slotted liners; the first well through slots over the interval 10,584-10,616 ft., and the second through slots over the interval at 10,650-80 ft.

East Side Complicated

Geologically the situation on the east side of the field is complicated. While there is obviously at least one main fault, there are indications of other faults, some probably transverse minor faults across the main one. These may well have the effect of creating separate wedges or blocks. With good production in the Pennsylvanian established in at least one of these wedges, the possibilities on the east side of Benedum have opened up substantially. The only pre-Permian dry hole on the east side is Plymouth 1 Dixon, far to the south in Section 2, Peter Beach Survey. This well tested the Ellenburger and other pre-Permian pays, and then was plugged back to make a producer in a Permian pay. Even this well is in an area that may be in a completely separate fault block.

Benedum is to be operated along the most modern lines of gas conservation. Both Plymouth and Slick-Urschel have gasoline plants under construction in the field, while El Paso Natural Gas Co is laying a line to the field as fast as pipe is available.

The Plymouth plant, according to announcements, will have an input-gas capacity of 80 million cubic feet per day. When operated at capacity it is expected to manufacture the following products: propane, 145,800 gal. per day; butane, 87,400 gal. per day; casing head 37,290 gal. per day.

The El Paso line, according to late reports, will consist of 95 miles of 24-in. line, extending from a compressor station being built along its main trunk system near Kermit, Tex., in a south and east direction to Benedum. There will be two spurs running south from this main line, one consisting of about 13 miles of $12\frac{3}{4}$-in. to Monahans field, and continuing on south with 30 miles of $8\frac{5}{8}$-in. to Santa Rosa field in northern Pecos County. The second spur will be a short one of $10\frac{3}{4}$-in. to McElroy field in Crane County. However, about two-thirds of the 170-180 million cubic feet of gas ultimately expected to be picked up daily by this line will probably come from Benedum field

I.A.M.'s General Secretary Wants 'Oil-Monopoly' Facts

WASHINGTON.—Ringing in all of the charges of monopoly in the oil industry based on the findings of the Temporary National Economic Committee and Eugene V. Rostow's book, "A National Policy for the Oil Industry," Eric Peterson, general secretary-treasurer of the International Association of Machinists, urged last week that President Truman call a conference of labor, farmers and other groups "free from domination by the oil magnates" to bring out the "facts about the oil monopoly."

Peterson made his plea for the conference in an address before the "National Emergency Conference on Resources," a privately sponsored meeting held in the auditorium of the Interior Department to call for immediate action to halt the wastage of the country's natural resources.

It was the I.A.M., Peterson asserted, that first sounded "the alarm against the oil lobby's attempt to transfer control over the tidewater oil resources" to the states from the federal Government which, he said, "has steadfastly refuesd to permit wasteful exploitation" of the tidelands.

The tidelands, the machinists' association said in a letter to President Truman last October, "must not be traded away for the private profit of the oil trust."

A.A.O.D.C. Safety Clinic Meets in Dallas, May 24

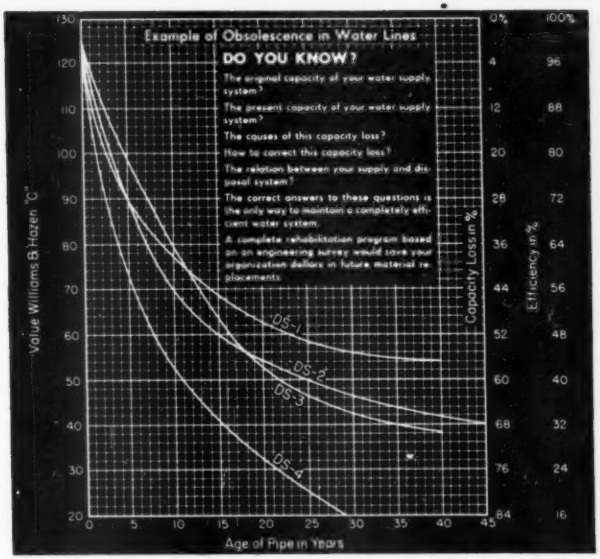
Problems of oil-field safety will be discussed during the fourth annual drilling safety clinic, conducted by the American Association of Oilwell Drilling Contractors at the Baker Hotel in Dallas, May 24-26.

A condensed schedule of events is listed below.

Tuesday, May 24: Address by Joseph S. Morris, president of the American Association of Oilwell Drilling Contractors; "Cimmittee Work Program for 1949 and Purpose of Safety Clinic," by J. Doyle Settle, secretary of the A.A.O.D.C.; "Cause and Cost of Accidents in the Drilling Industry," by Ben H. Mitchell, secretary, Texas Employers Insurance Association, Dallas; "Warning Systems to Prevent Running Into Crown Block," by Roy Dishman, Penrod Drilling Co., Shreveport; "Practical Applications of Accident Prevention on Rigs," conference discussion; "New Developments in Accident Prevention Training and New Protective Equipment Applicable to the Drilling Industry," by R. G. Benson, petroleum staff representative, National Safety Council, Chicago.

Wednesday, May 25: "Safety in Taking Drill Stem Tests," by F. C. Cooper, safety director, Sohio Petroleum Co., Oklahoma City; "Safety Color Code for Drilling Industry Brought Up-to-Date," by Fred Claiborne, Stanolind Oil & Gas Co., Tulsa; "Drilling Rig Heating," by Harry Markee, safety director, Phillips Petroleum Co., Bartlesville, Okla.; "Breaking in a New Employe," by C. W. Yancey, safety director, Rowan Drilling Co., Fort Worth; "Presentation of Accident Problems Confronting Drilling Contractors Doing Oil Field Hauling," by W. W. Duncan, safety director, Loffland Brothers, Tulsa, John S. Jackson, safety director, Danciger Oil & Refining Co., Baton Rouge, and V. V. Bruce, safety director, J. C. Hawkins, Dallas; "Analyzing the Problems Presented and Suggested Remedies," by Russell Fitzpatrick, motor transportation training division, Texas A. & M. College, and Charles T. Stamp, safety director, Oil Field Haulers Association, Inc., Austin, Tex.; transportation training film released by Stanolind Oil & Gas Co.

Do You Know The Rate of Capacity Loss in Your System!


Example of Obsolescence in Water Lines
DO YOU KNOW?
The original capacity of your water supply system?
The present capacity of your water supply system?
The causes of this capacity loss?
How to correct this capacity loss?
The relation between your supply and disposal system?
The correct answers to these questions is the only way to maintain a completely efficient water system.
A complete rehabilitation program based on an engineering survey would save your organization dollars in future material replacements.
Value Williams & Hazen "C"
Capacity Loss in %
Efficiency in %
Age of Pipe in Years
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DS-2
DS-3
DS-4

Actual Trends of Age-Coefficient Relation for Tar-Coated Cast Iron Supply, Transmission and Distribution Mains.

Now the rate of capacity loss in your system can be determined by engineering methods, by knowing the type of water in the system, the comparative age of the pipe, and the kind of pipe originally installed.

With the costs of maintenance, labor, and new equipment soaring to unprecedented heights, engineering analyses of water mains are the logical starting points in determining, not only the condition of the system, but how it can most economically be made to serve a plant at a minimum cost.

From: Report of Committee on Pipe Line Friction Coefficients New England Water Works Association.

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DETROIT • HOUSTON • NEW YORK • PHILADELPHIA • ST. LOUIS

STATISTICS and

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED MAY 14, 1949

	Total of all wells							Wildcat completions and discoveries									
						19 wk.		Cumulative total, 1949									
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	21	11	0	*10	22,941	449	557	0	0	0	0	0	0	0	0	0	0
Pennsylvania	26	11	2	†13	43,808	640	967	0	0	0	0	0	0	0	1	1	2
West Virginia	12	1	9	2	37,567	183	266	0	0	0	0	0	0	0	4	5	9
Ohio	21	11	6	4	49,134	386	449	0	0	0	2	2	1	0	2	16	19
Indiana	31	13	0	18	53,704	396	328	0	0	0	3	3	6	0	0	79	85
Kentucky	26	4	13	9	59,187	304	212	0	0	0	0	0	4	0	0	14	18
Illinois	59	32	0	27	144,114	724	659	2	0	0	13	15	12	0	0	127	139
Michigan	14	8	0	6	24,048	320	212	1	0	0	4	5	14	0	1	114	129
Kansas	80	41	3	‡36	264,067	1,037	963	1	0	0	13	14	20	0	2	129	151
Neb., Mo., Iowa	2	2	0	0	5,508	12	0	0	0	0	0	0	0	0	0	8	8
Oklahoma	104	54	10	40	388,772	1,449	1,376	2	1	0	20	23	56	8	6	203	273
Texas	274	161	29	84	1,107,911	4,666	3,899	12	0	3	44	59	157	16	43	799	1,015
North Central (Dist. 7-B & 9)	79	43	1	35	217,188	1,507	1,175	2	0	0	12	14	73	0	7	307	387
West (Dist. 7-C & 8)	66	56	1	9	270,681	1,035	1,052	3	0	0	8	11	22	0	0	71	93
Panhandle (Dist. 10)	26	9	16	1	80,016	381	205	0	0	0	0	0	1	0	0	1	2
Eastern (Dist. 5 & 6)	14	9	0	5	50,458	255	180	0	0	0	3	3	1	1	3	47	52
Gulf Coast (Dist. 2 & 3)	50	24	10	16	320,128	708	639	2	0	3	13	18	31	10	21	148	210
Southwest (Dist. 1 & 4)	39	20	1	18	169,440	780	648	5	0	0	8	13	29	5	12	225	271
Louisiana	32	22	4	6	195,645	711	687	1	1	0	2	4	18	6	1	67	92
Northern	18	14	3	1	61,298	365	450	0	0	0	1	1	1	0	0	29	30
Southern	14	8	1	5	134,347	346	237	1	1	0	1	3	17	6	1	38	62
Arkansas	11	5	0	6	43,773	§105	100	0	0	0	1	1	§2	0	0	24	26
Mississippi	8	3	0	5	64,447	132	135	0	0	0	4	4	3	0	1	36	40
Southeastern States	1	0	0	1	4,182	21	17	0	0	0	1	1	1	0	0	19	20
Montana	8	5	0	3	16,749	75	83	0	0	0	2	2	1	0	1	8	10
Wyoming	7	3	0	4	45,572	202	140	0	0	0	1	1	9	0	0	34	43
Colorado-Utah	4	2	0	2	17,145	46	84	0	0	0	2	2	1	0	0	18	19
New Mexico	8	4	0	4	38,745	201	222	0	0	0	2	2	3	0	0	18	21
California	39	31	0	8	193,718	960	998	2	0	0	7	9	19	0	2	165	186
Total United States	788	424	76	288	2,820,737	13,019	12,354	21	2	3	121	147	327	30	64	1,884	2,305
Total previous week	738	425	46	267	3,311,287	§12,231	11,571	15	3	5	111	134	§306	28	61	1,763	2,158
Total May 15, 1948	783	446	44	293	2,875,752			23	0	7	95	125	271	23	101	1,668	2,063

Service wells included: *10, †12, ‡1. §Revised.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.96			
19-19.9	2.07			
20-20.9	2.17	$2.25		$2.12
21-21.9	2.23	2.27		2.14
22-22.9	2.27	2.29		2.16
23-23.9	2.30	2.31		2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. (For detailed price changes in all fields see The Oil and Gas Journal, January 1, 1948, page 107.)

A.P.I. REFINERY REPORT, MAY 7

(Thousands of barrels)

District—	Crude runs, daily avg.	Production				Stocks at refineries, bulk terminals, in transit and in pipe lines			
		Gaso-line†	Kero-sine	Gas & dist. oil	Resid-ual	Gaso-line*	Kero-sine	Gas & dist. oil	Resid-ual
East Coast	760	2,324	165	920	1,244	27,793	8,288	17,582	10,728
Appalachian:									
District 1	90	274	41	67	81	2,756	356	575	450
District 2	67	248	36	50	118	1,219	145	220	314
Ind., Ill., Ky.	941	3,321	367	927	1,043	27,769	2,798	7,965	5,103
Okla., Kans., Mo.	401	1,509	148	560	467	12,705	1,029	3,349	2,216
Inland Texas	198	945	152	45	319	4,962	376	632	1,087
Texas Gulf Coast	1,232	4,414	523	1,422	1,580	18,603	2,677	9,012	8,043
La. Gulf Coast	417	1,391	244	754	289	5,938	2,089	2,995	2,166
N. La. and Ark.	66	165	37	106	95	2,213	541	897	175
Rocky Mountains:									
New Mexico	13	51		12	28	87	25	43	37
Other Rocky Mtn.	144	393	37	165	223	3,463	279	1,153	946
California	843	2,495	81	928	2,408	15,892	575	6,950	29,759
May 7, 1949‡	5,172	17,530	1,831	5,955	7,895	123,400	19,178	51,373	61,024
April 30, 1949	5,273	17,969	1,837	6,681	8,185	124,787	18,922	49,959	60,174

*Finished and unfinished. †At refineries including natural blended. ‡Comparable data for 1948 on new basis not available.

Bureau of Mines crude-oil stocks 272,595,000 bbl. as of May 7—up 1,340,000 bbl. One year ago 228,831,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl

East Texas†	$2.65	Pecos County, Texas (Yates)	$2.35
Kettleman Hills, California*	2.64	Bradford, Pennsylvania	3.27
Beauregard Parish	2.60	Eastern Ill. and Western Ind.†	2.77
Illinois Basin	2.77	Tomball, Texas Gulf Coast	2.83

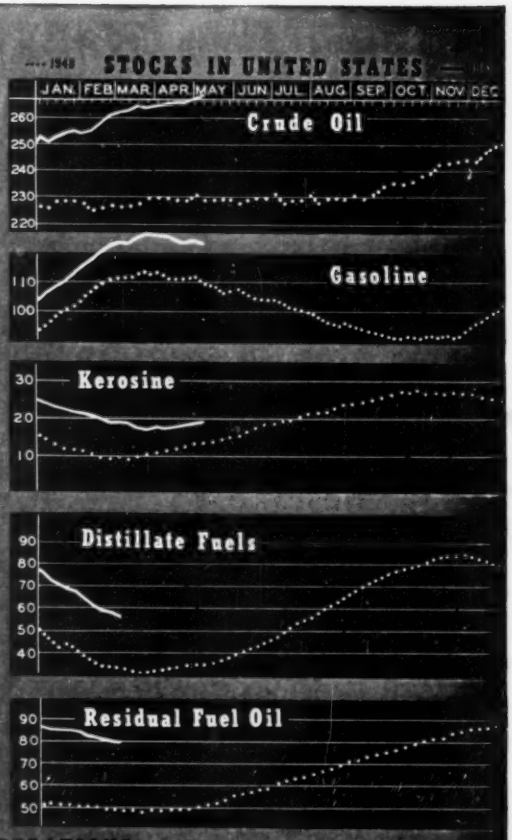
*37°-37.9°. †35° and above.

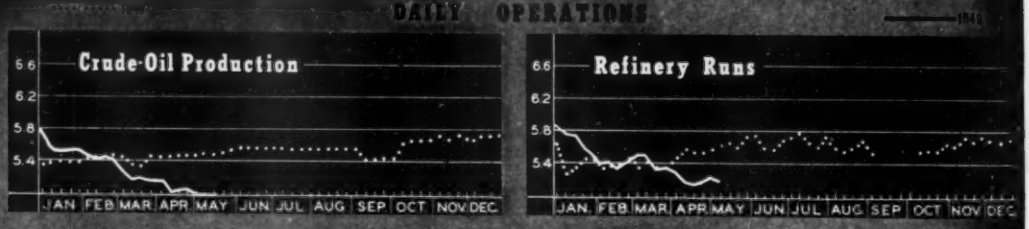
TRENDS

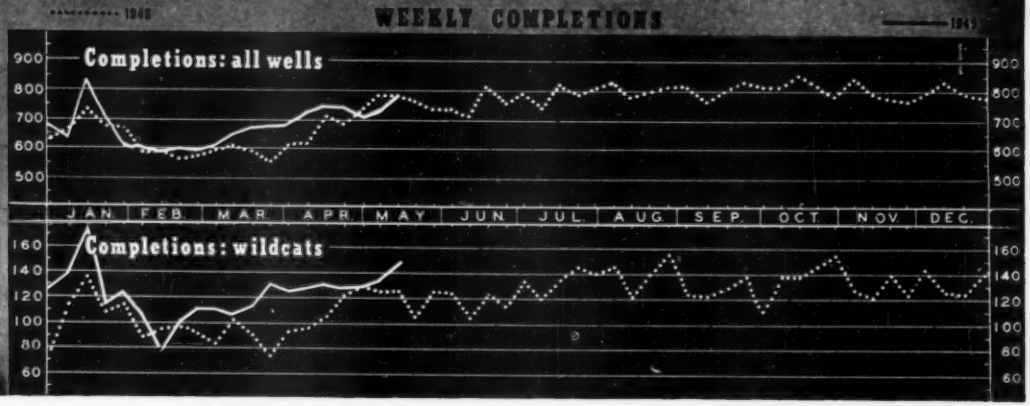
DAILY AVERAGE PRODUCTION FOR WEEK

	May 14 crude oil	B. of M. May demand	May 7 crude oil
Alabama	1,200	1,550	1,150
Arkansas	80,250	87,000	80,750
California	939,000	950,000	943,700
Colorado	65,000	62,000	65,500
Eastern	62,100	60,950	62,000
Florida	1,375	1,450	1,425
Illinois	178,100	165,000	179,100
Indiana	22,200	22,000	25,300
Kansas	296,500	300,000	282,550
Kentucky	22,800	21,000	23,600
Louisiana	501,100	492,000	502,000
North Louisiana	116,500		117,400
South Louisiana	384,600		384,600
Michigan	45,100	46,000	45,250
Mississippi	104,000	120,000	104,650
Montana	26,200	24,000	26,200
Nebraska	300	700	300
New Mexico	129,825	126,000	129,825
Oklahoma	429,650	410,000	429,500
Texas	1,884,600	2,300,000	1,884,600
Dist. 1 (Southwest)	25,690		25,690
Dist. 2 (Southwest)	118,675		118,675
Dist. 4 (Southwest)	184,350		184,350
Dist. 3 (Gulf Coast)	357,210		357,210
Dist. 5 (Eastern)	34,475		34,475
Dist. 6 (Eastern)	83,525		83,525
East Texas field	247,400		247,400
Dist. 7-C (West)	42,225		42,225
Dist. 8 (West)	520,150		520,150
Dist. 7-B (W. Central)	56,725		56,725
Dist. 9 (N. Central)	125,400		125,400
Dist. 10 (Panhandle)	88,775		88,775
Utah	400	350	400
Wyoming	120,450	130,000	122,500
Total United States	*4,910,150	5,320,000	4,910,300
Change from prev. wk., dn.	150		

Total production January 1-May 14 †704,538,545 bbl.
Same period last year (crude plus cond.) 732,921,265 bbl.
*Not incl. 83,390 bbl. condensate. †Incl. 11,392,965 bbl. condensate.







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MARKETS

FURTHER declines in prices for selected crudes reflect decreases in demand for the principal products from these crudes and reduced spot prices for these products.

Effective May 11, Ohio Oil Co. discontinued gravity scale postings for Oregon Basin, Byron, Garland, and Hidden Dome black-oil fields in Wyoming and posted a flat price of $1.65 per barrel for these fields. The new price represents a reduction of about 45 cents per barrel.

Stanolind Oil Purchasing Co. posted a new gravity schedule for Wyoming heavy, high-sulfur crudes with the new price effective May 13. The larger reductions were made in the postings for the lower-gravity crudes. The old schedule started with $1.97 for 15°-15.9°-gravity crude and advanced 2 cents for each degree change in gravity to $2.47 for 40° and above. The new schedule starts with $1.28 for 15°-15.9° and increases 6 cents for each degree to 26°-26.9°, then 5 cents per degree to 31°-31.9°, and 4 cents per degree to 36°-36.9° where the new and old schedules have the same posting. The light end of the schedule is identical with the old and ends with $2.47 for 40° and above.

This latest reduction in prices paid for heavy crude in the Rocky Mountain region is a continuation of the process of reducing the postings for low-gravity crude to bring them more nearly in line with prices being paid for heavy fuel.

Residual fuel has been the refiner's big problem for some time and prices for this product have been reduced to regain some of the markets that were being lost to other fuels. The reduction in heavy crude prices followed because residual is the principal product from these crudes.

The price of Pennsylvania Grade crude was cut another 13 cents per barrel effective May 11. This is the seventh in a series of cuts that started December 11 of last year, or in a period of 6 months. The new price for crude from Bradford, Alleghany, and Middle District is $3.27.

Corning crude, which is not classified as Pennsylvania Grade, was cut 40 cents per barrel to $2.70 effective May 6.

East Coast Kerosine Reduced

Reductions in the price of kerosine were made last week by major suppliers in the New York Harbor area. Esso Standard Oil Co. dropped its kerosine postings 0.8 cent per gallon to 8.4 cents at the harbor barge level. This touched off additional reductions elsewhere on the East Coast. Atlantic Refining Co. cut the price for this product in eastern Pennsylvania, Delaware, and northern New Jersey. Esso later in the week extended the reduction to Connecticut and Socony-Vacuum Oil Co. followed in this area.

This reduction brings kerosine into a more normal position with respect to the prices being quoted for No. 2 fuel. For the past 3 weeks the kerosine high has been 1.9 cents above the high for No. 2 compared with a 1.2-cent differential at the beginning of the year.

Sentiment appeared to be growing among suppliers in favor of inducements and guarantees to burning-oil customers who will fill their tanks during the summer period. Esso adopted a program designed to guarantee its customers against price declines between now and fall by billing September 1 in New York and northward and on October 1 in the southern area for deliveries made during the summer.

Gasoline demand continued strong in the Mid-Continent and North Central areas with heavy shipments expected between now and Memorial Day as marketers fill tanks for the opening of vacation season.

Representative Quotations

Representative spot-market quotations of leading suppliers as of May 16, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 73-75 octane	9½-9¾	11.6-12	9¼-10
Premium gasoline, 78-80 octane	10¼-10⅞	12.6-13	10¼-11
42-44 w.w. kerosine	8-8½	8-8.4	7¾-8½
No. 2 straw fuel oil	6¾-7	7.0-7.4	6⅜-6½
No. 6 residual	$0.90-1.00	$1.65-1.75	$1.20-1.30

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5¼	4¾	5
Grade 18-55	6.3	5.7	6.0

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	11
750 vis., No. 3-4 neutral	14
2,000 No. 5-6 neutral	15-16.5

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14

Western Pennsylvania

144-155 vis. 10 p.t. bright stock	21.5
180 vis., 0 p.t. neutral	20.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	5

LIGHT & EASY TO HANDLE, YET THEY'RE STRONG, RUGGED *and* PLENTY SAFE

When fitted with 4½" inserts, Kinzbach Type UBL Unit Slips weigh only 160 pounds, yet they'll hold your pipe with absolute safety. Unique hinge arrangement provides practically true radial closure and prevents binding or cocking. Separate, interchangeable inserts provide for inconformities in pipe walls; full-length contact between slip backs and rotary bushing permits full benefit to be obtained from available gripping surface.

KINZBACH TOOL CO., INC.
P. O. Box 277 Houston, Texas
Export Office: 74 Trinity Place, New York, N. Y.

TOWER PACKING

WRITE FOR BULLETIN 51 TODAY

U. S. STONEWARE
Akron 9, Ohio

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For more than 30 years, we have specialized in piping supplies for the oil industry. Write, phone or wire for quotations on your piping needs.

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EQUIPMENT MEN . . . in the News

Watts, Payne Elected to Membership in A.A.A.A.

The American Association of Advertising Agencies has announced that Watts, Payne - Advertising, Inc., of

DON WATTS

OSCAR PAYNE

Tulsa and Dallas has been elected to membership in the association.

Watts, Payne-Advertising, Inc., has been in business for 20 years, having been established in 1930 by Don Watts and Oscar Payne.

A.A.A.A. was established in 1917 in response to the request of media for a responsible spokesman of the country's advertising agencies and now comprises 239 member agencies with about 400 offices in the United States and foreign countries, handling well over two-thirds of the total volume of national advertising.

Calhoun Becomes Sales Manager for Sweet

L. A. CALHOUN

C. H. Sweet, president and founder of Sweet Oil Well Equipment Co., Hobbs, New Mexico, has announced the appointment of Lloyd A. Calhoun as general sales manager.

Calhoun formerly worked for McCullough Tool Co. as a sales engineer. While with McCullough, Calhoun traveled extensively in South America, where he introduced the gun perforator and in the Rocky Mountain and Gulf Coast areas, where he introduced the Magna-Tector.

Houston Engineers Opens Two New Service Points

Two additional service points for H-E-Reversing Tool Service have been opened in the Gulf Coast areas by Houston Engineers, Inc., Houston. The new service points are Houma, La., and Alice, Tex.

Frank Carnahan is manager of the Harvey store and W. O. "Jack" Moorman is manager of the Alice division. Houston Engineers have operated fishing-tool services in the Gulf Coast for more than 29 years. They also operate a fleet of service units out of Houston and New Iberia, La.

Frank Champion to Direct Spartan Tool & Service

FRANK CHAMPION

Spartan Tool & Service Co. has elected Frank Champion as its president and general manager. The board of directors has also announced the election of Turner Briggs as vice president in charge of sales.

Champion, formerly president and general manager of Wright Drilling Co., will take charge of Spartan Tool & Service operations immediately. He is a graduate engineer of University of California and has had wide experience in oil-field-equipment manufacture and distribution.

At the same time the company announced that it has been appointed distributor in Texas and Louisiana for B. & W. Co., Inc., manufacturer of multiflex scratchers and centralizers.

At the time Champion assumed his new duties with Spartan, he severed his connections with Wright Drilling Co., Inc., and has resigned as president and general manager of the firm. Spartan operates on the Texas Gulf Coast, Southwest Texas, West Texas, California, Louisiana, and the Rocky Mountain region. "Addition of the B. & W. line of centralizers and scratchers gives Spartan a complete oil well cementing service," Champion said.

"The Spartan men know the meaning of service," Champion said, "and we can assure every oil operator now that as new cementing services and techniques are developed, Spartan will make every effort to make these improved techniques available to the oil industry as quickly as possible."

Lincoln Electric Elects Three New Directors

Lincoln Electric Co. has announced the election of three additional members to its board of directors. The new directors are G. F. Clipsham, assistant to the president; William Irrgang, director of plant

G. F. CLIPSHAM

W. IRRGANG

L. K. STRINGHAM

engineering; and L. K. Stringham, director of welding development.

Glipsham joined Lincoln in 1929 and was active in various sections of the country as a welding engineer. In 1935 he went to England to organize and serve as president of Lincoln Electric Co., Ltd.

Irrgang also started with Lincoln in 1929 and for the past 2 years has been engaged in various phases of plant operation. Stringham has been with the company since his graduation as an electrical engineer from Cornell in 1933.

Barnes Joins Century As Sales Engineer

Century Geophysical Corp., Tulsa, has named Arnold D. Barnes sales and service engineer in the Southwest and Gulf Coast divisions. Formerly with the geophysical division of Magnolia Petroleum Co. Barnes has served with Century as field coordinator and equipment engineer, and in recent months in the research and development division. In addition to his new assignment, he will continue field servicing in the area.

Hedrick Forms New Engineering Firm

W. C. HEDRICK

G. McGRANAHAN

H. H. BOWEN

R. H. GADDY

Wyatt C. Hedrick, Houston, well-known southwestern architect and engineer, has announced the formation of a new enterprise, Wyatt C. Hedrick Engineering Corp. This new firm will specialize in the planning and construction of plants for the petroleum, natural gas, chemical, and allied industries.

Heading the firm is G. M. McGranahan, former assistant general manager of Dow Chemical Co.'s Texas division, and more recently vice president and general manager of McCarthy Chemical Co., Houston. Other officers in the new firm include H. H. Bowen, vice president; Robert H. Gaddy, secretary, and Hedrick who is vice president and treasurer.

McElheny Joins McCullough As Sales Engineer

I. J. McCullough, president of McCullough Tool Co., announces the appointment of John B. McElheny as sales engineer, operating out of the Casper, Wyo., branch. McElheny, well known in the Rocky Mountain oil fields, was formerly manager of operations for International Cementers in the Rocky Mountain area.

New Lucey Firm Formed to Serve Canadian Industry

Lucey Export Corp. has announced the incorporation of a new organization, Lucey Export (Canada) Ltd. The new firm, expected to give increased service to the Canadian oil industry, has taken over the operations of Lucey Equipment (Canada) Ltd., Drilling Supplies, Ltd., and Mineral Sales, Ltd.

Officers of the new firm are: W. S. Evans, New York City, president; C. E. Paradice, New York City, vice president; E. M. Wilkinson, Calgary, managing director; J. J. Saucier, K. C., Calgary, director; and H. W. Miles, Calgary, sales manager.

The company, whose head office is in Calgary, also has stores at Edmonton and in Leduc field near Devon. It plans to open a new store in Redwater field.

Ideco Announces Expansion And Organization Changes

International Derrick & Equipment Co. has announced the expansion of plant facilities at Columbus, Ohio, to manufacture Ideco spudders, Hydraulic drilling rigs, and cable tools formerly produced at Marietta, Ohio.

Dan Duncan has been appointed executive engineer for the company. He will have charge of the coordination of all Ideco engineering and will make his headquarters at Beaumont, Tex.

Al Pranger, formerly general sales manager for Guiberson Corp., has joined Ideco's technical service department, and will make his headquarters with the machinery and export sales offices in Dallas.

Duncan originally joined Ideco in 1948. Prior to this he was associated with Emsco Derrick & Equipment Co. for 9 years.

Southern Engine & Pump Opens Houma, La., Store

Southern Engine & Pump Co., with headquarters in Houston, has announced the opening of an additional branch at Houma, La. The branch office will be in charge of W. G. Byl, who for some time has been in charge of service operations in southern Louisiana.

Dowell Transfers McCormick to Tulsa

J. C. "Mac" McCormick, district engineer with Dowell Incorporated in Borger, Tex., has been transferred to the Tulsa office and promoted to development engineer.

McCormick specializes in Electric Pilot services with Dowell. The Electric Pilot is an electric well-surveying device which is used to determine the location and relative importance of permeable zones in oil wells. The new development engineer has been with Dowell since May 1937. Before his transfer to Borger, McCormick was with Dowell in Kilgore, Tex.

Dr. C. L. Smith Joins Ethyl Product Develeopment

Dr. Charles L. Smith has been appointed to the staff of the product development department of Ethyl Corp., in New York, to assist in the development and application of various chemical products.

For the past 4 years, Dr. Smith has been technical advisor of National Agricultural Chemicals Association, which has just removed its offices to Washington, D. C.

He has also served as research entomologist at Rutgers University, manager of Doggett-Pfeil Co., and chemist for Interstate Chemical Manufacturing Co. He is a graduate of Rutgers University.

Rector Sales Meeting at Fort Worth

Rector Well Equipment Co., Inc., recently held its annual sales meeting at the company plant at Fort Worth to discuss recent improvements in Full Bore cementing equipment, new products, and to visit the enlarged plant. Field representatives and office personnel attending were: George A. Donaldson, Houston; James P. Bowling, Corpus Christi; George Stewart, Fort Worth; Grady Neal, Fort Worth; Virgil R. Cloer, Fort Worth; Joe La Bate, Fort Worth; L. R. Fedrizzi, Craig, Colo.; George E. Milligan, Fort Worth; Catherine Mitchell, Fort Worth; W. P. Knight, Midland, Tex.; R. V. Evridge, Fort Worth; C. L. Cron, Houston; J. L. Pinkard, Fort Worth; J. R. Richardson, Fort Worth; L. L. Rector, Fort Worth; Charles Zartman, Fort Worth; W. M. Counts, Fort Worth; Harvey Petross, Oklahoma City; George DeArman, Cody, Wyo.; D. C. Walker, Tulsa; M. T. Harrell, Shreveport; Grace Lamm, Fort Worth; M. C. Davis, Denver; Carmen Hammons, Fort Worth; Joyce Thomas, Fort Worth; C. M. Kestler, Oklahoma City; Don C. Davis, Fort Worth; and W. F. Ware, Odessa, Tex.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 98' "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: 1 U-10 Unit Rig Complete with 96' mast. Ready to drill a well. Very reasonable. S. E. Frogge, Tel. 6-5518, Box 4455, Oklahoma City, Okla.

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000' —Respooled for Your Inspection — Cable Tools for Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

EQUIPMENT FOR SALE

SOME MORE PIPE FOR SALE!

8⅝" OD 24 lb. Used Lap Weld Casing T & C
7" OD 20 lb. Used Lap Weld Casing T & C
7" OD 17 lb. Used Lap Welding Casing T & C
5½" OD 15 lb. Used Lap Weld Casing T & C
5½" OD 13 lb. Used Lap Weld Casing T & C
2⅜" OD 4.60 lb. Upset Lap Weld Tubing
2" Regular Used Lap Weld Line Pipe

AVAILABLE FOR IMMEDIATE SHIPMENT

*Located in Charleston, W. Va., area. *All in A-1 Condition.

For complete information and prices contact the following:

OKMULGEE SUPPLY CORPORATION
Okmulgee, Oklahoma

RIGHTWAY PIPE & SUPPLY CO.
Alice, Texas

SAN ANTONIO PIPE & SUPPLY CO.
1735 South Alamo St.
San Antonio, Texas

MAX G. WEINER CO.
1401 Centennial St.
McKeesport, Pa.

New CENTRIFUGAL PUMP UNITS

For Water, Crude and Petroleum Products

HIGHLY PORTABLE—EXTREMELY FLEXIBLE

PRICED AT LESS THAN HALF OF REGULAR COST

BYRON JACKSON "PUP" 2-stage Multiplex Centrifugal Pump direct connected to **CHRYSLER** Model 36 (Ind. 9) 8-cylinder Gasoline Engine, Mounted on rugged oil field type skid with necessary gauges and controls.

Designed for a wide range of operating conditions, this unit is particularly adapted to "pick-up" service in the oil fields, or other services where large variance in head and capacity are desirable.

Units are guaranteed to be in factory-new condition. Regular production models pump and engine. Parts readily available. Inquire for prices and specifications.

LUCEY PRODUCTS CORPORATION
OIL WELL SUPPLIES
TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: 1 new patented Tom Dietle all steel, heavy duty casing pulling machine, 10" x 55' "A" mast—Double Drum—Double brake spudding attachment for ripping casing. I.H.C. motor, fully equipped, starter, 4-speed power transmission, also tools. Located Eureka, Kansas. Phone 1032, 917 North Elm or Tulsa: 2136 So. Yorktown, Phone 2-0061.

MODEL 53 Keystone well drill mounted on 1946 Ford tandem drive truck. Excellent condition throughout. Sacrifice price. R. B. McElwaine, Box 127, Little Rock, Ark.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

TWO Complete Rotary rigs, 126' masts, 6' substructures, Blowout preventors. Fully equipped to start drilling. One Double Drum National 50 with Two Compounded Twins GM Diesel Engines and Parkersburg Hydromatic Brake. 1 Unit U-10 with 3 Compounded D13000 Engines. Equipment all in A1 condition. Located at Newcastle, Wyoming. Kiowa Drilling Company, Inc., 717 Union National Bank Building, Wichita 2, Kansas. Phone 3-8013.

10—35,000 bbl. steel storage tanks, shell and bottom, cut down, ready to load, Stoy, Illinois. Price $5,000.00 each.

W. C. BERRY
P.O. Box 1858, Tulsa, Okla., Phone: 3-6141

TANKS—TANK CARS
NEW LOW PRICES

2—74,000 Bbl. Steel Tanks, Like New
2—10,000, 3—1,000 and 3—65 Bbl. API New Bolted Tanks
80—8,000 and 10,000 Gal. Cap. Tank Cars

THE DARIEN CORPORATION
60 E. 42nd St. N.Y. 17, N.Y.

FOR SALE

Several used Pumping Motors in excellent condition—VIKU Waukeshas, HP336 Budas, and U318 Allis-Chalmers. Prices reasonable.

We specialize in rentals of Oil Field Equipment.

SOUTHERN PIPE & SUPPLY CO.
Justin 8-5525
P.O. Box 8051 Houston 4, Texas

Hydraulic casing pulling machine, mounted on 1½ ton Chevrolet truck, complete with telescope mast pole, all tools, slips, automatic break-out for pulling of 5½", 7", 8" and 10" casing. Also two ton Chevrolet truck, thirty ft. Nabors float trailer and new 1949 ¾-ton Chevrolet pick-up, all which goes to make up complete unit. Machine and equipment were all purchased new and have been in service approximately ten months.

WESTERN PIPE & EQUIPMENT CO.
922 Neil P. Anderson Building
Phone 2-5668 Fort Worth, Texas

USED PUMPING EQUIPMENT & PIPE

1—Buda Engine Model JK4 to Gaso Pump 2½" x 5" x 10"
1—Buda Engine JK4 to Wheatley Pump 8" x 10"
1—Waukesha Engine CRS6 to Allis-Chalmers 15 KW-DC generator with starting equipment
115,000 ft. 6⅝" OD 17.9# Seamless, Range 3, P.E.
80,000 ft. 4½" OD 8.64# Seamless, Range 3, P.E.
50,000 ft. 6⅝" OD 19.45# T&C, Lapweld
All A-1 Condition

W. C. BERRY
P.O. Box 1858, Tulsa, Okla., Phone: 3-6141

EQUIPMENT FOR SALE

ALL NEW ELECTRIC WELD LINE PIPE
PLAIN ENDS BEVELED FOR FIELD WELDING

3½" O.D. 6.63# —51c— 4½" O.D. 8.64# —57c; 8⅝" O.D. 27.74# —$1.81; 12¾" O.D. 33.38# —$2.11; 14" O.D. 36.71# 25" wall, also 24" O.D. 79.06# 31.25 wall at $125 per ton, all F.O.B. Pittsburgh, Pa. Have large quantities and prompt deliveries. Also all other sizes.

ALL NEW SEAMLESS CASING A.P.I. J-55, L.T. & C., 8 RT, R2 5½" O.D. 15½# —$1.20; 7" O.D. 20# —$1.56; 10¾" O.D. 40.50# —$3.28; 2⅜" O.D. 4.07# External Upset tubing, 53c. Also all other sizes.

Box C-918, The Oil and Gas Journal, Tulsa, Oklahoma.

BUCYRUS-ERIE 36L Spudder—A-1 condition. Will sell with or without complete set of tools, including complete set of casing tools. L. H. Bebout, Route 3, Newark, Ohio.

FOR SALE: Insley K-12 Back hoe, same as new, only five months old. If interested call: Paul Haines, Jacksboro, Texas, Phone 8 or at Marion, Kansas, 478-J.

TWO CARDWELL RL Sudders. Good operating condition. Fully equipped with 59' mast, light plants, lines and tools. Located Central Oklahoma. Prices and terms. Write: Barnes Drilling Co., 22 West Fourth St., Tulsa, Oklahoma.

NEW CENTRIFUGAL PUMPS

Byron Jackson—Aurora—Lombard—Gould—Hale—Gorman Rupp—Wayne & Novo, complete with engine power, also 1½ to 20 KW light plants. H. A. McCarthy, 310 Thompson Building, Tulsa, Oklahoma.

FOR SALE

(4) DW-10 Caterpillars with Scrapers. Marion Model 362 Shovel Front. Buckeye Model 70, ¾ yd. Shovel Front.

A. C. R. COMPANY
19615 Nottingham Rd., Cleveland, Ohio
Kenmore 8000

MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts.

OKLAHOMA MACHINE & SUPPLY CO.
Ada, Oklahoma

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO
3415 Westminster, Dallas 5, Texas

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

FOR SALE

NEW CASING AND LINE PIPE

25,000' 5½" 15½# 8RT J55 R2 API Smls. Casing
15,000' 7" 23# 8RT J55 R2 API Smls. Casing
6,000' 8⅝" 28# 8RT J55 R2 API Smls. Casing
4,641' 9⅝" 36# 8RT J55 R2 API Smls. Casing
7,015' 10¾" 40½# 8RT J55 R2 API Smls. Casing
19,000' (593 Joints) 6" Std. Byer's Wrought Iron L.W. Plain End Pipe (ASTM A72-33)

Above subject to prior sale.

THE NATIONAL COOPERATIVE REFINERY ASSOCIATION
P.O. Box 770 McPherson, Kansas
Phone 610

FOR SALE: 11-24" Merco Fig. 4449 Plug Valves, New. Michigan Gas Storage Company, P.O. Box 729, Jackson, Mich.

2—Allis-Chalmers HD19 tractors; Caterpillar D82U352 Hydraulic dozer; Brand New Caterpillar D7. Miller, 335 Southwest Blvd., Victor 6312, Kansas City, Missouri.

FOR SALE—STEEL STORAGE TANKS

7—55,000 bbl., Maud, Oklahoma
15—80,000 bbl., Hominy, Oklahoma
11—55,000 bbl., Mexia, Texas
27—80,000 bbl., Mexia, Texas

For further information, write

STANOLIND OIL PURCHASING CO.
Atten: L. M. Jones, Box 591, Tulsa, Okla.

BLOWOUT PREVENTER—10" Hinderliter type D.U. 4-M, 4½" rams, 6,000 lb. Year old, used 45 days—$1500. Shaleshaker, Thompson Model SR. Less sample machine. Used 30 days—$550.00. Midwestern Drillers, 816 North Grant, Liberal, Kansas. Phone 960.

FOR SALE: Range 1, used Lapweld Casing, Sizes 4" to 10", also a large amount of Tubing and Line Pipe. Location: West Virginia. Pipe Pulling & Plugging Company, Box 213, Charleston, West Virginia.

FOR SALE—Franks Model FA with automatic chuck, complete with watertruck and all equipment. Mounted on late 2-ton trucks. Due to other interest will sell very reasonable. Box C-913, The Oil and Gas Journal, Tulsa, Oklahoma.

LOW PRICES ON PIPE
NEW MATERIAL

17 Ton of New Smls Tbg, 2.03" O.D. x .278" Wall, all 8 ft. lg.
30 Ton, 3" O.D. x ½" wall new smls mechanical tubing, 18' random Lengths

200,000 feet of 3" O.C. x .125" wall prime tested Electric Weld Pipe
11,500 feet of 12¾" O.D. x .250" wall Electric Weld
640 feet of 12¾" O.D. x 11/32" wall Electric Weld
9,500 feet of 13⅜" O.D. x ⅜" wall Electric Weld
4,900 feet of 16" O.D. x ¼" wall Electric Weld
2,000 feet of 20" O.D. x ⅜" wall Electric Weld
560 feet of 24" O.D. x 5/16" wall Electric Weld
20,000 feet of 24" O.D. x ⅜" wall Electric Weld Prime Tested
17,500 feet of 24" O.D. x ½" wall Electric Weld Prime Tested
1,000 feet of 26" O.D. x ⅜" wall Prime Untested

Excellent Condition—No. 1 Used Pipe beveled ends

4,000 feet of 6" Standard Weight Welded
1,500 feet of 8" Standard Weight Welded
4,000 feet of 15" O.D., 3/16" wall Spiral Weld
19,000 feet of 18" O.D., ¼" wall Electric Weld

Excellent condition used Electric Weld Steel Pipe

7 Ton of 30" O.D. ½" wall approx. 40 ft. lgs.
63 Ton of 36" O.D. ½" wall approx. 40 ft. lgs.
93 Ton of 40" O.D. ½" wall approx. 40 ft. lgs.

"Equivalent—New" 4" Pipe

165,000 feet of 4" standard seamless and/or lap weld machine straightened and beveled. (This pipe was in a surface line, never buried, and is free from pitting. Many pieces still retain mill blue and stencils).

300 Ton, miscellaneous lots, new and used seamless and electric weld pressure and mechanical tubing in sizes ½" O.D. to 10¾" O.D. Write for listing.

The above lots are priced to sell!

Large Standard Pipe Stock in Addition to the Above

Write, Wire, or Phone L. B. Foster Company for Quotations

L. B. FOSTER COMPANY

PITTSBURGH 30	NEW YORK 7	CHICAGO 4	HOUSTON 2
P.O. Box 1647	Park-Murray Bldg.	231 S. LaSalle St.	Electric Bldg.
Phone WAlnut 3300	Phone BArclay 7-2110	Phone CENtral 6757	Phone BEacon 3-9431

EQUIPMENT FOR SALE

FOR SALE: Wilson Super Spudder—Double drum, double pole mast, complete with walk ways, roof, wings, and fully skidded—Good Wire—Priced to sell. Wilson Mogul Drawworks, powered by 145 GK Waukesha—Portable derrick—Wilson Snyder 6 x 16 pump, powered by WAK Waukesha—4½" Drill Pipe, Traveling Block, Swivel, 4¼" x 40' Kelly, BJ Tongs, etc.—Priced to sell. Write: T & R Oil Field Machine & Supply Co., Box 98, Carmi, Ill.

FOR SALE: One 55 ft. Steel Telescope heavily reinforced Rig Pole with Bucyrus Head. Brand New. Priced Cheap. Neosho Drilling Co., P.O. Box 265, Chanute, Kansas.

FOR SALE: At Houston 27 miles 6" 12.98# DRL used Line Pipe beveled. All or any part. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: 10,000 ft. 20" OD x ¼" Wall New Electric Weld Steel Pipe. Double Random Lengths; 50,000 ft. 18" OD x ⅜" Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

ROTARY equipment, almost new, only used few days, 1800' PK rods, Drill collar 30'x4¼" with 3½" box, King water swivel 1¼", PK slips, hoisting plugs, overshot. Complete outfit $4500, or will divide. We handle new and used spudders, rotaries, core drills, pipe, tools, cable. Fishing tools and equipment rented. Pressey & Son, Pueblo, Colo.

FOR SALE: Sullivan #200, 1945 model, mounted on 1941 White truck. Rig in excellent condition, but drill pipe poor. Sale price $13,000. Phone 377-W, 932 Edwards, Midland, Texas.

FOR SALE: Near Wynona, Oklahoma, 32'x96'x10' Sectional Steel Corrugated Iron Building now erected. $1500.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

CASING AND LINE PIPE END USERS
If interested please state wants. W. F. Plagenz, 502 Park Bldg., Cleveland 14, Ohio.

FRANKS double drum model 5000 spudder, excellent condition. Mast, lines, tools, dog house, light plant, butane tank. Complete and ready to go. Gleason Drilling Co., Russell, Kansas.

FOR SALE: 2 Cyl. 2 Cyc. 100 HP Superior horizontal direct connected engine-compressor unit complete. Plant shut down due to shortage of gas. Pollard & Davis, Fort Stockton, Texas.

FOR SALE: 83 Star Drilling Machine, lines and tools. Good condition. Address Mrs. Mary Bliss, Telephone No. 59, Box 338, St. Elmo, Illinois.

EQUIPMENT WANTED

WELL-KNOWN drilling company needs rotary drilling skid unit—6,000'. Must be in good shape and not too old. Mail inventory and full particulars. P.O. Box 26, Tulsa, Oklahoma.

WANTED—Failing model 44, 1500, 1000, or 55. Other make of similar capacity. Fred E. Butler, 1013 So. Cedar, Casper, Wyo.

MANUFACTURER WANTED

INVENTOR has new flowing device for Oil Wells designed to preserve gas. Manufacturer needed on Royalty basis. John Turmes, 3824 Rusty Dell, Fort Worth, Texas.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

REPRESENTATIVES WANTED

MANUFACTURERS' Representatives: to represent manufacturer of proved liquid level gauges to oil industry, will meet all competition, write full details: E. Townill, Suite 210, 2349 West Devon Avenue, Chicago 45, Illinois.

HELP WANTED

NEW Directory of 140 large oil companies in U.S. 10 of them having foreign operations, showing where to apply for jobs. Price $5.00 postpaid. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (our 29th year).

MATERIALS ENGINEER—Experience in listing, expediting, and storehouse control of material, with oil refinery maintenance or construction background. Write, giving training, experience, references and personal details to: P. O. Box 2094, Billings, Montana.

ASSISTANT SALES MANAGER: Large midwest independent needs young aggressive man with good experience in petroleum sales for position of assistant sales manager. Expanding operations require high-type executive for this permanent position. In replying, give full details including age, education, and salary required. Replies confidential. Box C-900, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Oil Treating Engineer to organize and conduct treating program, for major oil company, production operations, with main offices in Oklahoma City. Should have adequate production background and previous treating experience. Write giving detailed experience, education, references, salary requirements, age, and personal details. Replies confidential. Box C-914, The Oil and Gas Journal, Tulsa, Oklahoma.

PURCHASING AGENT: Familiarity with refining equipment and specifications. Write, giving training, experience, references and personal details to: P.O. Box 2094, Billings, Montana.

WANTED: Experienced oil field equipment salesman with practical experience background on spudders and cable tools for sales position with nationally known oil field equipment manufacturer. Box C-904, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURER'S REPRESENTATIVE wanted to sell oil field drilling equipment in the Gulf Coast area. Write Box C-906, The Oil and Gas Journal, Tulsa, Oklahoma, giving complete information including present lines and references.

WANTED: Experienced salesman to call on the oil country trade to solicit electrical business. Prefer married man 30 to 35 years old, M.E. or E.E. graduate or equivalent experience. This is an opportunity for a man who is willing to work, salary commensurate with ability, plus bonus and expenses. Please reply to Box C-903, The Oil and Gas Journal, Tulsa, Oklahoma.

WELDING and Boilermaker Foreman—Must have experience in these trades and in supervising. Oil refinery experience preferred. Write, giving training, experience, references and personal details to: P. O. Box 2094, Billings, Montana.

ENGINEERS, Executives, Technical Men: Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

ENGINEERING

During the next several months we will increase our Engineering Organization engaged in the design of Oil Refinery Plants and Power Plants. Location Cleveland, Ohio. The men we need should be qualified as draftsmen, designers, checkers or in higher engineering skills on design of piping, instrumentation, pressure vessels, structural steel, concrete, mechanical or electrical. For presenting your qualifications and prompt consideration, write to us for application form.

ARTHUR G. McKEE & CO.

2300 Chester Ave., Cleveland 1, Ohio

HELP WANTED

WANTED: Refinery Chemist, must have degree in Chemical Engineering, together with 3 to 5 years' Laboratory experience; give complete personal information and salary expected in first letter; location Western Canada. Box C-908, The Oil and Gas Journal, Tulsa, Oklahoma.

Established reliable industrial plant Engineering and Construction firm in Houston, Texas, wishes to license the engineering and or construction of processes in the Chemical, Petro Chemical or Petroleum industry in the Gulf Coast and Southwest industrial areas. Box C-921, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM Engineer for major oil company desires position with better opportunity for advancement. Graduate mechanical engineer. Some equipment manufacturing experience. Age 25. Married. Box C-920, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVE: 40 years old. Graduate Petroleum Engineer. Good record of achievement. Well known to Oil Circles on the Gulf Coast and in Southwest Texas. 15 years experience engineering and managing Sales direct and through distributors to the Production, Drilling, Pipe Line and Natural Gas and Gasoline Industries. Live in San Antonio prefer to headquarter there and work Southwest Texas. Available immediately. Can furnish top flight references. Box C-922, The Oil and Gas Journal, Tulsa, Oklahoma.

CAPABLE Supply Man. Twenty years' experience two Major supply companies. Mid-Continent Area. Desires connection with independent supplier on profit sharing basis. Write Box C-901, Oil & Gas Journal, Tulsa, Okla.

ENGINEER, experienced domestic and foreign and as drilling, production and operations superintendent. Fluent Spanish with knowledge of others. Age 36. Desire responsible connection foreign or domestic. Box C-910, The Oil and Gas Journal, Tulsa, Okla.

CONTROLLER-TREASURER
Experience with independent oil company in production, refining, marketing accounting, taxes and finance; presently employed; desire change. Box C-885, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE desires affiliation with a major oil company. Graduate Chemist, M.S. Petroleum Engineering, 20 years experience, 18 years gasoline testing lab. manager. Qualified for: Public Relations, Sales Promotion, Employee Training, Advertising Layout and Aptitudes. Box C-925, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN—Ten years Kansas and Oklahoma experience in independent producer's district office. Working knowledge of office procedure and accounting. Good references. Box C-926, The Oil and Gas Journal, Tulsa, Oklahoma.

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Address Box C-923

The Oil and Gas Journal
Tulsa, Oklahoma

SITUATIONS WANTED

GEOLOGIST: 1948 Graduate, desires summer position commencing now; top scholastic background with experience in drilling, surface and sub-surface geology. Interested in exploration and mapping. Box C-884, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B.S. with seven years' experience in Gulf Coast and Venezuela. Desires domestic position. Age 31, married. Box C-907, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Superintendent. Registered Engineer 25 years experience in refinery operation, design, construction. Proficient in rehabilitating, adapting available materials, and broad knowledge of petroleums. Box C-915 The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer: 7 yrs. experience drilling and production, Mid-Continent and Gulf Coast, past 2 yrs. in supervisory capacity desires position with an active oil company. Box C-911, The Oil and Gas Journal, Tulsa, Oklahoma.

INCOME TAX CONSULTANT — Specialized experience in natural resources, pipelines, etc. Available now. Box C-924, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Six years thorough experience in reservoir engineering, valuation, well completion, and production operations. Excellent scholastic record. Desire responsible position with progressive company. Presently employed. Box C-919, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

WANTED PARTNERS ready to invest up to twenty thousand dollars in big mining estate, Honduras, C. A., comprising numerous rich mines and placers. For information: write J. L. Cadrin, 716 Nolen Street, Kilgore, Texas.

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SOUTHEASTERN NEW MEXICO
Oil leases for sale near latest outstanding Ellenburger discovery. Grant Keyes, 311 White Bldg., Roswell, New Mexico.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Ky.

FOR LEASE for oil and gas—acreage in Brazoria County near Angleton, Texas. Write E. Hufford, Box 633, Boulder City, Nevada.

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OIL LEASES for sale in large, small or medium size blocks in Colorado, Wyoming, New Mexico, Montana, Arizona. Wholesale or retail. Write for descriptive list. Dyer-OJ, 1835 Champa, Denver, Colorado.

PRODUCERS, Drilling Contractors; 23,000 acre block, excellent structure, joining N. M., northeastern Arizona. Yours for immediate drilling, adjoining exploration, 1/8 royalty. C. C. Smith, Casa Grande, Arizona.

FOR LEASE: SE 1/4 Sec. 12, TWN 28, Range 3-W, Grant County, Oklahoma. Less than one mile northeast of several big producers, oil override. Harvey Brecheisen, Eudora, Kansas.

SETTLED Production: Approximately 560 acres, 36 producing wells, approximately 60 bbl. per day, all Bartlesville sand wells. Box C-917, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: New 86 acre lease, Shelby County, Texas, one mile from production, deep test now going down. Price $6.00 per acre. C. A. Parker, Box 451, Center, Texas.

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CALENDAR

May

American Petroleum Institute, Lubrication Committee, Broadmoor Hotel, Colorado Springs, Colo., May 22-23.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 23-25.

American Association of Oilwell Drilling Contractors' fourth annual drilling industry safety clinic, May 24-25, Baker Hotel, Dallas.

Society of Automotive Engineers, diesel engines, Engineering Societies Building, New York, May 26.

American Petroleum Institute, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., May 26-27.

Natural Gas and Petroleum Association of Canada, annual meeting, Hotel London, London, Ont., Canada, May 26-27.

Fourth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas A. & I. College, Kingsville, May 30-June 1.

June

Petroleum Equipment Supplier's Association, annual meeting Broadmoor Hotel, Colorado Springs, Colo., June 5-7.

Society of Automotive Engineers, summer meeting, French Lick Springs Hotel, French Lick, Ind., June 5-10.

National Oil Scouts and Land Men's Association, annual meeting, Shamrock Hotel, Houston, June 9-11.

Canadian Gas Association, annual convention, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, Pa., June 16-17.

Kentucky Oil & Gas Association, annual meeting, Hotel Lafayette, Hotel Phoenix, Lexington, Ky., June 23-24.

American Society of Mechanical Engineers, semiannual meeting, University of California Extension Building, San Francisco, June 27-30.

August

United Nations Scientific Conference on the Conservation and Utilization of Resources, U. N. Interim Headquarters, Lake Success, N. Y., August 17-September 6.

NOMADS

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

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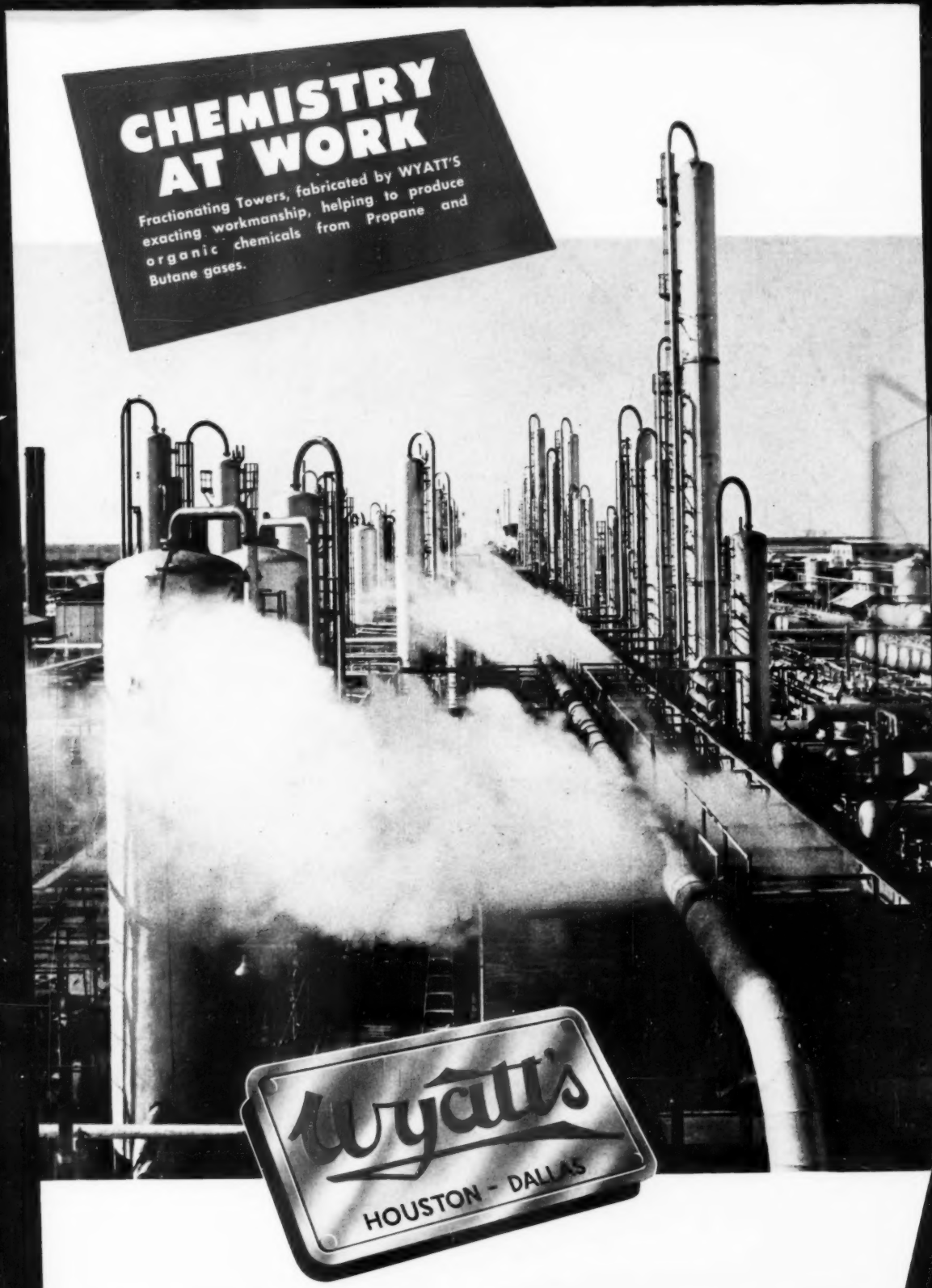
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